THE IRON TRADE REVIEW

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CONSUMPTION MAKES GOOD RECORD,

But Capacity is Too Great---Canadian Car Company Places Large Order---Many Meetings Being Held

The structural steel tonnage offered by builders to manufacturers and fabricators during the year is estimated at about 1,750,000 tons. This indicates that the present year has equaled 1906, which was the largest in the history of the industry. Although not all of the new business offered has been placed, such an aggregate tends clearly to show that the iron and steel industry is suffering from too much capacity for any ordinary year. and that the business which has actually been done this year is very creditable.

Railroad Buying

A contract has been awarded to the Carnegie Steel Co. for about 20,000 tons of plain material to be used in car construction by a Canadian car company. Inquiries for 900 cars are pending in the Chicago district. The Pennsylvania Steel Co. has taken about 3,500 tons of structural material for the Norfolk & Western, and 1,700 tons for the Pennsylvania. The Virginian railroad has awarded 2,400 tons to the Virginia Bridge & Iron Works. Some important inquiries for locomotives, including one for 153 for the Harriman lines, and 50 for the Boston & Maine, are pending. The Delaware & Hudson is in the market for 10,000 tons of rails, and the New York Central is expected to cover for its requirements very soon. The Carnegie Steel Co. will furnish 7,500 tons of plain material for cars to be built by the Pressed Steel Car Co., for the Jamison Coal & Coke Co. The controversy concerning specifications, which has prevented the Pennsylvania tonnage from being entered, has not yet been adjusted. The outlook is that rail orders for next year will be greater than recently estimated.

Pig Iron

The disposition of buyers of pig iron not to place orders until after inventories have been taken, has been very strongly manifested during the last week, and many melters are also showing a determination to delay deliveries on contracts. A pig iron merchant of long experience estimates that of the entire stock of pig iron in the country, not over 15 per cent is in the hands of consumers. With the exception of the buying of some good tonnages by pipe makers in the east, the pig iron market has been extremely dull. A new furnace is to be built by the Alan Wood Iron & Steel Co., Philadelphia, at Swedeland, Pa.

Price Conditions

Numerous meetings of manufacturers have been held during the past few days to consider the trade conditions. As a result of the meeting of sheet manufacturers, prices are firmer, but business has correspondingly decreased, and some mills expect to close at an early date. Investigation as to the structural shape market indicated that the price of 1.40c, Pittsburg, is being well maintained, except on very large orders, but later reports are that this price is being shaded $1 per ton in the Chicago district. At the meeting of the tin plate manufacturers, the general sentiment was one of satisfaction over the outlook for next year. The industry is running at about 60 per cent of capacity. More mills will be closed within a week or two. It is not expected that the tin plate market will show much activity during the next six weeks. Tin plate prices are firm. Bar iron is very irregular, and sales have been made at 1.30c, Chicago, and even lower at St. Louis. The 1.40c quotation on steel bars is being shaded $1 per ton in Chicago, and occasionally in other centers.

Structural Conditions

Some buyers are counting on a decline in prices after the first of the year, and from recent awards of public work, particularly two high schools at Toledo, it is evident that the contractors expect to be able to shade present prices. It is, however, by no means certain that this expectation will be realized. Sentiment recently aroused in an effort to prevent general demoralization is very strong, and it may succeed in its objects in spite of the rather unfavorable outlook at present.

Pipe, Wire and Coke

Orders for iron and steel pipe are light, and competition is active. Prices of both iron and steel pipe are being shaded. Business in wire products is fair. Low prices continue to be made on crude steel. The plan to form a general selling agency for coke in the Connellsville region has been abandoned.

WORLD'S IRON MARKETS

PITTSBURG

Meetings Consider Trade Conditions —Market is Very Dull.

Office of THE IRON TRADE REVIEW,
510 Park Building, Dec. 13.

The principal feature of the iron and steel trade this week is the series of meetings being held by representatives of the various branches of this industry which have been called by the chairmen of the different committees of the American Iron and Steel Institute. James A. Campbell, president of the Youngstown Sheet & Tube Co., and chairman of the sheet branch of the institute, presided at a meeting of sheet manufacturers held in Pittsburg on Dec. 8. E. T. Weir, president of the Phillips Sheet & Tin Plate Co. and chairman of the tin plate branch of the institute, presided at a meeting of tin plate manufacturers in this city today. Representatives of the plate and structural steel branch will meet in Pittsburg probably on Wednesday of this week, and representatives of the merchant bar branch will meet on Thursday of this week. Other meetings will be held later by representatives of other branches, but details have not been made public. These meetings are being held to discuss trade conditions in general and follow closely upon the general meeting of iron and steel manufacturers held in New York several days ago.

General market conditions show little change from a week ago and the opinion is now general that there will be little, if any, improvement until after the first of the year. It is now believed that a decision by the interstate commerce commission regarding the proposed advance in freight rates will be postponed for several weeks, probably until April, and for this reason it is likely that there will be comparatively little buying on the part of the transportation companies for some time. Low prices have been made on semi-finished steel. Steel bars and structural steel are firm at 1.40c, Pittsburg, although a few small mills are shading 1.40c, Pittsburg, on plates. Actual bookings of wire, nails, pipe and bar iron have been light. The pig iron market has been extremely quiet and few coke sales are reported. Efforts to form a central coke selling agency apparently have been abandoned.

Negotiations involving fairly heavy tonnage of steel rails for 1911 delivery are pending. The Delaware & Hudson is in the market for 10,000 tons and the New York Central is expected to cover for its requirements in the very near future. It is expected that definite information will be available in the near future regarding negotiations for cars which have been pending for some time. The Carnegie Steel Co. will furnish 7,500 tons of plain material for cars to be built by the Pressed Steel Car Co. for the Jamison Coal & Coke Co. Local car builders have received several orders for mine cars during the past week.

Pig Iron.—There has been little if any change in the local pig iron situation as compared with a week ago. No important sales have been reported; there is little inquiry in the market, and, while prices apparently are unchanged, there has not been enough trading to test the market and reports are heard that quotations noted below might be shaded on desirable business. Considerable interest is centered in conditions surrounding the foundry and basic markets. On the former, leading furnace interests continue to quote $14, valley, for both prompt and forward delivery, although $13.75, valley, has been done in some cases and it is reported that a large furnace interest is soliciting first half business at a still lower figure The Standard Sanitary Mfg. Co., Pittsburg, today closed for 400 tons of low silicon foundry iron. While the price is not given, it is understood to have been below $13.75, valley. Another consumer has taken 200 tons of No. 2 foundry for forward delivery at $14, valley.

Notwithstanding reports circulated recently that $13, valley, can be done on prompt basic, an offer of $13.25, valley, on 2,000 tons for December shipment has been refused and some of the furnaces supposed to have made low prices a month ago apparently have withdrawn all quotations on this grade. Consumers of basic are showing more interest in the situation and will be obliged to purchase some first quarter iron, although actual inquiries have not been put out.

The Bessemer situation is unchanged. The general asking price is $15, valley, but in view of the fact that no sales have been reported for some time, it is stated in some quarters that this figure, no doubt, could be shaded on desirable business. Odd lots of malleable have been sold at $13.50, valley, for prompt shipment, and it is likely that two or three deals involving this grade will be closed before the end of the week. Demand for gray forge is light, no sales having been reported in this market. During the past few days furnace interests have been requested to cut down shipments against running contracts and consumption at present is not as heavy as a month ago. Additional furnaces will be blown out within the next two weeks and December in all probability will establish a new low production record for 1910. It is announced that the furnace of the Punxsutawney Iron Co., at Punxsutawney, Pa., will be blown out before the end of the month. We quote the market as follows:

Pig Iron Prices.

(Prompt Shipment.)

Bessemer, valley	$15.00
Bessemer, Pittsburg	15.90
Basic, valley	13.25
Basic, Pittsburg	14.15
No. 2 foundry, Pittsburg	14.65
Gray forge, Pitsburg	13.90
Malleable, Pittsburg	14.15

(Second Quarter.)

Bessemer, valley	$15.00
Bessemer, Pittsburg	15.90
Basic, valley	13.50
Basic, Pittsburg	14.40
No. 2 foundry, Pittsburg	14.90
Gray forge, Pittsburg	13.90
Malleable	14.40

Ferro-Alloys.—Notwithstanding that several sales have been reported in this market recently covering the first half of next year, local sellers of ferro-alloys look for increased buying after Jan. 1. The largest inquiry for ferro-manganese pending in this market at present is for 500 tons for first half. Prices are not very firm and $38.50, Baltimore, can be done on both prompt and forward business, although some sellers are holding for higher prices. Demand for 50 per cent and domestic ferro-silicon is light.

Reports of extremely low prices on 50 per cent ferro-silicon have not been confirmed.

We quote ferro-manganese at $38.50 to $38.75, Baltimore, for prompt and first half of 1911. The freight rate from Baltimore to Pittsburg is $1.95 per ton.

Fifty per cent ferro-silicon is quoted at $55.50 to $56, Pittsburg, for prompt and first half; 12 per cent, $25; 11 per cent, $24; 10 per cent, $23, f. o. b. Jisco and Ashland furnaces. The freight rate to Pittsburg is $1.90. The foreign grades are held at $1 or more a ton over domestic prices.

Plates.—There is more inquiry for plates and plans are being considered for new projects which will require heavy tonnage of plain material, but no large contracts have been placed in this market during the week. Considerable interest is centered in the meeting of plate manufacturers to be held in Pittsburg this week, although it is not likely that any reduction in prices will follow. The market appears to be holding fairly firm at 1.40c, Pittsburg, although some of the smaller mills have taken business at 1.35c, Pittsburg. The Carnegie Steel Co. will furnish 7,500 tons of plain material for the Jamison Coal & Coke Co.'s cars, for which the Pressed Steel Car Co. was awarded the general contract some time ago. Bids will open Wednesday on approximately 12,200 tons of plates and shapes for the new battleship to be built in the government yards. The Buffalo, Rochester & Pittsburg Railroad Co. is expected to enter the market within the next month for about 2,000 freight cars and 20 passenger cars. The Kanawha & Michigan railroad is asking prices on 1,000 50-ton gondola cars. Several large trunk lines have practically decided upon their car requirements for next year, but it is not likely that many large awards will be announced before the first of the year. Receivers of the Wabash-Pittsburg Terminal Railroad Co. have asked the courts for authority to issue receivers' notes, the proceeds to be used in the purchase of 2,000 freight cars, but authority has not been given as yet. Local mills of the leading interest are operating on a more satisfactory basis than last month. We quote the market as follows:

Tank plates, ¼ inch thick, 6¼ to 100 inches, 1.35c to 1.40c. Extras are as follows, per 100 pounds: Boiler and flange steel plates, 0.10c; A. B. M. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.20c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches excepting straight taper plates varying not more than 4 inches in width at ends, narrowest end not being less than 30 inches, 0.10c; circles, 0.20c. Plates in widths over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1c. Gages under ½ inch to and including 3-16 inch plate on thin edge, 0.10c; under 3-16 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms net cash in 30 days.

Sheets.—The sheet market is somewhat firmer as a result of the meeting of manufacturers in Pittsburg last week, when trade conditions were thoroughly discussed and manufacturers decided that a general reduction in prices would not bring out any additional business at this time. Three companies were not represented at the meeting, but have announced their intention of maintaining prices. Low quotations noted earlier in the month have been withdrawn and the minimum base prices quoted by manufacturers today are, black No. 28 gage, 2.20c; blue annealed No. 10 gage, 1.65c; galvanized No. 28 gage, 3.20c; painted roofing sheets No. 28 gage, 1.55c, and galvanized roofing sheets No. 28 gage, 2.75c, all f. o. b. Pittsburg. There is comparatively little new business developing, although several sales have been reported during the past week at the above prices. We quote prices as follows, with $1 a ton added as the delivered price in the Pittsburg district:

Blue annealed sheets, No. 10 gage, 1.65c; box annealed sheets, No. 28 gage, 2.20c; galvanized sheets, No. 28 gage, 3.20c; painted roofing sheets, 1.55c per square for No. 28 gage, 2½-inch corrugation; galvanized roofing sheets, 2.75c per square for No. 28 gage, 2½-inch corrugation.

Tin Plate.—Practically all of the tin plate manufacturers of the country were represented at the meeting at the Fort Pitt hotel in this city today, called by E. T. Weir, president of the Phillips Sheet & Tin Plate Co. and chairman of the tin plate branch of the American Iron and Steel Institute. Market conditions in general were thoroughly discussed and the manufacturers expressed themselves as being pleased with the outlook for next year. Reports read at the meeting show that the tin plate industry is running at about 60 per cent capacity. Additional mills will be closed down within the next week or so, and it is not likely that the market will show much activity during December and January. Heavy tonnage has been booked for delivery next year, and prices are firm. One of the questions discussed at the meeting related to the price of tin mill sizes of sheets. Owing to the fact that demand for tin plate has been rather light during the past several weeks, some mills are understood to have shaded prices of this product slightly. On sheet mill sizes of black sheets No. 28 gage the price is 2.20c, Pittsburg, the same as on tin mill sizes No. 28 gage, but there is a difference in the differential between gages of the two grades of sheets and this is understood to have been partly responsible for the extremely low prices quoted recently on black sheets. On account of the firmer tone of the sheet market, however, it is expected that there will be a better understanding as to quotations on tin mill sizes. The base price on tin plate is as follows:

Coke tin plate, 10-pound basis, 14 x 20, $3.60, f. o. b. mill, Pittsburg district.

Rails and Track Material.—While official announcement has not been made of any large awards for steel rails during the past week, further progress is reported on negotiations pending between the steel companies and some of the large trunk lines and the outlook for this branch is somewhat brighter than a month ago. It is probable, however, that some contracts now pending may not be placed until after the first of the year. There has been no further development in connection with the Pennsylvania Railroad Co.'s rail orders which are being held up by some of the steel companies. The Delaware & Hudson Railroad Co. is in the market for 10,000 tons of rails. Specifications are coming in at a fairly satisfactory rate and mills are operating on practically the same basis as last month. New business in light rails is not very heavy, although fairly heavy tonnage is involved in negotiations pending for delivery over 1911. Makers of spikes and track bolts report a fair volume of business for first half delivery and prices appear to be firm. We quote the market as follows, the base price on open-hearth rails being 1.34c per pound, at the mill:

Fifty-pound and heavier, 1.25c per pound; carloads and less than 500 tons, 1.34c per pound; light rails on base weight of 40 to 45 pounds, $26.50 to $27, the schedule on the other weights being irregular and subject to negotiations; angle splice bars for standard sections, 1.50c, Pittsburg; standard spikes, 1.55c to 1.60c, Pittsburg; hand spikes, 1.65c to 1.70c, Pittsburg; track bolts, 2.30c, Pittsburg.

Steel.—Low prices are still being made on semi-finished steel, although the new quotations have not brought out any large amount of business. Inquiries for semi-finished steel for delivery over first quarter and first half of next year noted a few weeks ago have been withdrawn, as manufacturers will not accept business at today's prices for delivery beyond the next month or so. At the present time, there is very little spread in prices of billets and sheet bars. Bessemer and open-hearth billets have sold as low as $22.50, makers' mill, and open-hearth sheet bars have sold at $23, makers' mill. It is likely that this figure could be shaded. Conflicting

statements are made as to prices on Bessemer sheet bars. In some quarters it is stated that sales have been made as low as $23, Pittsburg, although the larger mills are not quoting below $24, Pittsburg. It is known, however, that $24, Pittsburg, has been quoted by several mills, but they did not get the business. Pittsburg mills report sales of forging billets at from $27.50 to $28, Pittsburg, although lower quotations have been made by mills just west of this city. We quote the market as follows:

Bessemer 4 x 4 billets with 0.25 carbon and less are quoted at $22.50 to $23, Pittsburg, with the usual extras for size and analysis, and open-hearth rolling billets, $22.50 to $23, Pittsburg. Forging billets are quotable at $27.50 to $28, Pittsburg. Bessemer sheet and tin bars are quoted at $23.50 to $24, and open-hearth sheet bars are quoted at $23, makers' mill, located within the $1, Pittsburg, freight limits.

Hoops and Bands.—Little activity is noted in this market. Cooperage interests are figuring on their requirements over first half, but new business is light and specifications are not as heavy as a month ago. Prices appear to be firm. We quote the market as follows:

Hoops in carload lots, 1.50c; in less than carload lots, 1.65c; bands, 1.40c, base, with net extras, as per standard steel.

Merchant Bars.—Specifications against running contracts, while not heavy, are coming in at about the same rate as last month, and this market as a whole has been somewhat steadier than other branches. Agricultural implement makers continue to send out encouraging reports and are specifying for first quarter requirements. Steel bars are firm at 1.40c, Pittsburg, and in the immediate Pittsburg district bar iron prices show little change, although exceedingly low quotations are reported from western centers. New business and specifications against contracts for shafting are exceedingly light. We quote the market as follows:

Common iron bars, 1.35c to 1.40c, Pittsburg; Bessemer and open-hearth steel bars, 1.40c; plow and cultivator, 1.40c; channels, angles, zees, tees, under 3-inch, 1.50c, all f. o. b. mill. The following differentials are maintained on steel: Less than 2,000 pounds of a size, 0.35c advance. Cold rolled and ground shafting, 55 per cent in carloads and 50 per cent in less than carloads, delivered in base territory.

Muck Bar.—Sales of muck bar during the week include only small lots, as consumers are pretty well covered. Prices show practically no change and we continue to quote the best grades of muck bar at $29, Pittsburg.

Structural.—In the immediate Pittsburg district, there is comparatively little new structural work appearing and orders during the past week have been chiefly for small lots. The report that definite action will be taken within the next 10 days on the new Quebec bridge has not been confirmed. The general contract for the new building to be erected at Beaver Falls, Pa., by the Standard Sanitary Mfg. Co., has been awarded, but a contract has not yet been awarded for the 1,000 tons of steel to be used in this structure. Several of the railroads are figuring on fairly heavy tonnage of bridge steel, but no contracts have been awarded. Local steel companies will be represented at a meeting of manufacturers of plates and structural steel to be held in Pittsburg on Thursday of this week, when trade conditions will be discussed. Prices appear to be firm at 1.40c, Pittsburg. We quote the market as follows:

Beams and channels, 15 inches and under, 1.40c; over 15 inches, 1.50c; zees, 1.40c; tees, 1.45c; angles, from 3 to 6 inches, 1.40c; over 6 inches, 1.50c; universal and sheared plates, 6¼ inches wide and wider, 1.40c.

Merchant Pipe.—Bookings of iron and steel pipe during the first two weeks of December have been light as compared with the last three months. Competition for business is very keen and there is evidence of shading of prices on both iron and steel pipe, although the discounts quoted below still represent the market level. Two local companies during the past week placed orders for 3, 4 and 6-inch steel pipe aggregating approximately 21 miles. In addition to the above, a fair amount of miscellaneous business is reported. Some mills have comparatively little business on their books and in all probability will be obliged to curtail production within the next few weeks. We quote the following official discounts in carload lots, subject to the usual preferential discount to the larger buyers, merchant pipe, where specified, being offered in from ⅛ to 6 inches:

Iron and Steel Basing Prices.

	Steel.		Iron.	
	Butt weld.			
	Black.	Galv.	Black.	Galv.
⅛, ¼, ⅜ inch	72	58	68	54
½ inch	75	63	71	59
¾ to 1½ inch	79	69	75	65
2 to 3 inches	80	70	76	66
	Lap weld.			
2 inches	76	66	72	62
2½ to 4 inches	78	68	74	64
4½ to 6 inches	77	67	73	63
7 to 12 inches	75	59	71	55
EXTRA STRONG, PLAIN ENDS.				
		Butt weld.		
⅛, ¼, ⅜ inch	69	59	65	55
½ inch	74	68	70	64
¾ to 1½ inch	78	72	74	68
2 to 3 inches	79	73	75	69
EXTRA STRONG, PLAIN ENDS.				
		Lap weld.		
2 inches	75	69	71	65
2½ to 4 inches	77	71	73	67
4½ to 6 inches	76	70	72	66
7 to 8 inches	69	59	65	55
9 to 12 inches	64	54	60	50
DOUBLE EXTRA STRONG, PLAIN ENDS.				
		Butt weld.		
½ inch	64	58	60	54
¾ to 1½ inch	67	61	63	57
2 to 3 inches	69	63	65	59
DOUBLE EXTRA STRONG, PLAIN ENDS.				
		Lap weld.		
2 inches	65	59	61	55
2½ to 4 inches	67	61	63	57
4½ to 6 inches	66	60	62	56
7 to 8 inches	59	49	55	45

Plugged and reamed pipe is furnished at 2 points higher price, either butt or lap weld.

Boiler Tubes.—Users of merchant and locomotive boiler tubes are not drawing upon their contracts as heavily as a month ago, although this market is very firm. Some of the railroads report a shortage of motive power and some fairly large awards for locomotives are anticipated after the first of the year. We quote the market as follows:

Boiler Tubes.—Makers of merchant

	Steel.	Iron.
1 to 1½ inch	49	43
1¾ to 2¼ inch	61	43
2½ inch	63	48
2¾ to 5 inch	69	55
6 to 13 inch	60	43

2½ inch and smaller, over 18 feet, 10 per cent net extra.

2¾ inch and larger, over 22 feet, 10 per cent net extra.

To destination east of the Mississippi river will be sold at delivered discount for carloads lowered by two points, for lengths 22 feet and under; longer lengths, f. o. b. Pittsburg.

Wire Products.—A fair volume of miscellaneous business in wire and nails for delivery prior to Jan. 1 is reported in this district. However, jobbing interests are not buying for first quarter requirements and the market is not showing much activity. In the immediate Pittsburg district, no sales have been reported below $1.50 for plain wire, $1.70 for wire nails and $1.65 for cut nails, although in the territory along the Ohio river these prices have been shaded $1 a ton. Some manufacturers are still following the policy of selling for only 60 days ahead. We quote the market as follows:

Wire nails, jobbers' carload lots, $1.65 to $1.70; retailers' carload lots, $1.75; cut nails, jobbers' carload lots, $1.65; painted barb wire, jobbers' carload lots, $1.70; retailers' carload lots, $1.75, with 30c for galvanizing; plain wire to jobbers in carloads, $1.45 to $1.50, and to dealers, in carloads, $1.55; polished staples, $1.70; galvanized staples, $2.

Wire Rods.—A few rod mills which were idle during October and the early part of November are now in operation and as a result there is keen competition for business and users have been able to pick up odd lots at bargain prices. While the general asking price of Bessemer rods is $28, Pittsburg, it is understood that this price has been shaded 50 cents a ton. We quote Bessemer rods at from $27.50 to $28, Pittsburg, and open-hearth rods at $28, Pittsburg.

Coke.—Additional coke ovens in the Connellsville region have been blown out during the past week and a still further curtailment in production is expected from now on until the first of the year. The market has been extremely dull since Dec. 1, although prices appear to be firm. Probably the most

important development in the market during the past week is the statement that efforts to establish a central coke selling agency have practically been abandoned. With one or two exceptions most of the large furnace interests have covered for their full requirements over 1911 on a sliding scale basis, only one or two deals having been negotiated at a flat price. Some of the furnace interests which have been getting their coke on contract during the past few years likely will buy in the open market beginning Jan. 1, as their contracts will expire this month. As a result, sellers of coke expect slightly heavier buying after Jan. 1, although additional furnaces likely will be placed on the inactive list within the next two or three weeks. Five days is the general working time in the Connellsville region, although a number of independent or merchant interests are running six days a week. The outlook for next year is not very promising. Consumers of foundry coke are not drawing upon their contracts as heavily as a month or so ago. We quote standard Connellsville furnace coke, for prompt shipment, at from $1.45 to $1.55, ovens, and for first half at from $1.75 to $1.90, ovens. On high grade Connellsville foundry coke, we quote from $2 to $2.05, ovens, for prompt delivery; for first half, from $2.25 to $2.50, ovens. The Connellsville *Courier's* figures for the week ending Dec. 3, show 23,965 active ovens, with an output of 289,668 tons, compared with 23,961 active ovens and a production of 285,049 tons the previous week.

Old Material.—Conditions surrounding the local scrap market show practically no change from a week ago. Sales are light; there is very little material being offered by producers, and prices are not very firm. While the quotations given below probably could be shaded on desirable business, there has not been enough trading during the past week to thoroughly test the market. In several instances producers of scrap and dealers have been requested to discontinue shipments against running contracts until after the first of the year. It has been pretty well established during the past week that heavy melting steel can be had as low as $13.50. We quote, gross tons, delivered in the Pittsburg district, including Monessen, Sharon, Steubenville, Brackenridge and Follansbee, as follows:

Heavy melting scrap	$13.50 to 14.00
Rerolling rails	14.50 to 15.00
Bundled sheet scrap	10.00 to 10.25
Iron axles	24.00 to 24.50
Old iron rails	15.00 to 15.25
No. 1 wrought scrap	14.00 to 14.50
Old car wheels	13.00 to 13.50
Low phosphorus	17.50 to 18.00
Machine shop turnings	9.00 to 9.50
Cast borings	8.50 to 8.75
No. 1 cast scrap	14.00 to 14.25
Malleable	14.00 to 14.50
Stove plate	11.00 to 11.50

CHICAGO

Cheerful Feeling Exists in Spite of Very Dull Conditions.

Office of THE IRON TRADE REVIEW,
1328 Monadnock Blk., Dec. 13.

In the face of dull business, sentiment in the Chicago market is distinctly optimistic. While it is admitted on all sides that December will probably show the poorest record of any month this year, nevertheless the feeling is strong that conditions will not grow much worse and that the best is to be hoped for in the future. A heavy structural tonnage in the city of Chicago is awaiting final action of the city council on some details connected with the new building ordinance. A few western railroads are showing a moderate interest in the car market and inquiries for 900 cars of various types are noted in this district. One of the least encouraging features is the small amount of business on the order books of rail and bar mills. A leading independent interest in Chicago expects to close its steel bar mills this week and at least one of the rail mills in this vicinity will close within a few days unless some substantial orders are received.

Pig Iron.—There is practically no life to the local pig iron market, and no inquiries of consequence are noted. Some sales are being made, but they are confined to small tonnages, principally car loads. The demand for off-grade iron is perceptibly better than for standard grades. Iron high in sulphur with a good silicon content is readily salable. A few sales of off-grade iron are being made for prompt shipment; we note a sale of 1,200 tons of this character. Quotations of southern iron on a basis of $11, Birmingham, for first quarter, are being made rather freely. The same general tendency is observed regarding northern iron, on which the premiums have practically disappeared, permitting it to be obtained for $16, for first quarter, without much trouble. Quotations below $11.50, Birmingham, for first half can not be confirmed, and it is doubtful if this figure can be shaded to any extent. The demand for Lake Superior charcoal iron is light, and prices are weak, the market being now quotable $17.50 to $18 per ton for prompt shipment, representing a decline of practically 50 cents during the past month.

We quote the market, f. o. b. Chicago, as follows:

(This year's delivery.)

Lake Superior charcoal	$17.50 to 18.00
Northern foundry No. 2	16.00 to 16.50
Southern foundry No. 2	15.35 to 15.85
Southern silveries, 5 per cent silicon	16.85 to 17.35
Jackson Co. silveries 8 per cent	19.40
Malleable Bessemer	16.00 to 16.50
Alabama basic	15.35 to 15.85

(First quarter delivery.)

Lake Superior charcoal	18.00 to 18.50
Northern foundry No. 2	16.00 to 16.50
Southern foundry No. 2	15.35 to 15.85
Southern silveries, 5 per cent silicon	17.35 to 17.85
Malleable Bessemer	16.00 to 16.50
Alabama basic	15.35 to 15.85

Billets.—No sales of forging billets are being made in this market, except a few very small tonnages. Nominal quotations remain $28, Chicago, but this will be shaded $1 or more on desirable business.

Merchant Bars.—Low prices still prevail on bar iron, and sales at 1.30c, Chicago, are reported. Some makers who are reluctant to quote below 1.35c a short time ago, are now quoting 1.32½c freely. Business in steel bars is very quiet and specifications are light. A prominent independent interest expects to close its steel bar mill the latter part of this week. Largely through the effect of competition from outside points, steel bars are being quoted on a basis of 1.35c, Pittsburg, although the larger interests are making strenuous efforts to maintain prices. In spite of comparatively dull business, most of the makers are steadfastly optimistic and refuse to be disturbed over the outlook.

We quote, Chicago delivery, as follows:

Bar iron, 1.30c to 1.35c; hard steel bars, re-rolled, 1.45c to 1.55c; soft steel bars and bands and small shapes, 1.53c to 1.63c, base; hoops, 1.73c to 1.83c; planished or smooth finished tire steel, 1.78c to 1.83c, base; iron finished tire steel, 1.73c, base; smooth finished machinery steel, 1 inch and larger, 2.43c; spring steel, 2.28c; crucible spring steel, 2.78c; tool steel, 7c to 9c, with higher prices for special grades. Quotations on shafting are 55 per cent off the list for carload lots, and 50 per cent off for less than carload lots, carload freight allowed to points in base territory.

On iron and steel from local stock, we quote as follows:

Bar iron, 1.80c to 1.90c, per pound base; soft steel bars, 1.80c to 1.90c per pound base; soft steel hoops, 2.10c to 2.20c, full extras.

Structural Material.—The warehouse business in structural material is slow, and contracts let reported in this market are unusually light. Geo. W. Jackson, Inc., Chicago, has taken a contract for the changes in the elevated loop structure, 415 tons. The Geo. A. Fuller Co. has taken a general contract for the McNeil building, 880 tons, but the steel has not yet been purchased. As announced in THE IRON TRADE REVIEW last week, the Thompson-Starrett Co. has taken the general contract for the Insurance Exchange building, Jackson boulevard and Sherman street, which will require about 12,000 tons. There is a large amount of structural business in the Chicago territory, which will be let as soon as the city council reaches a decision regarding the height limit and other de-

tails for new buildings. Local structural mills are operating less than 50 per cent capacity, and current mill bookings are light.

We quote, mill prices for structural shapes, f. o. b. Chicago, as follows:

Beams and channels, 15 inches and under, 1.58c to 1.63c. For extras, see Pittsburg report.

Store prices, f. o. b. Chicago, are as follows:

All angles, 3 inches and larger, including 6 inches, $1.80 to $1.90 per 100 pounds; angles over 6 inches, $1.90 to $2 per 100 pounds, base; beams, 3 to 15 inches, inclusive, $1.80 per 100 pounds, base; channels, 3 inches and larger, $1.80 per 100 pounds, base.

Rails and Track Supplies.—Western railroads are still holding back their rail orders and the outlook at present is that at least one of the rail mills in this district may close down shortly for the rest of the month, unless substantial tonnages are booked in the near future. Reduced quotations on track supplies have stimulated business to some extent and there is a slight improvement in this line.

See Pittsburg report for prices on standard sections. We quote, light rails and track supplies for Chicago delivery, as follows:

Light rails, carloads, 40 to 45-pound, 1.16c to 1.20½c; 30 to 35-pound, 1.19½c to 1.24c; 16, 20 and 25-pound, 1.20½c to 1.25c; 12-pound, 1.25c to 1.29½c.

Light section relayers, 45 pounds and under, subject to inspection, $21 to $23; standard section re-laying rails, subject to inspection, $23.50 to $24.

Track supplies, f. o. b. Joliet, angle bars, 1.50c to 1.60c; railroad spikes, 1.65c to 1.70c; smaller size spikes, 1.70c, base; track bolts with square nuts, 2.20c to 2.30c, base.

Plates.—The plate market remains heavy and prices are soft. A number of mills in the middle west are quoting on a basis of 1.35c, Pittsburg, and some plates are being shipped into this market at this price. There is a ripple of interest in the car market. The Great Northern is inquiring for 500 all-steel ore cars, which order may be closed this week. The Atlanta & West Point R. R. is in the market for 100 steel flat cars, and the Chicago, New York & Boston Refrigerator Line will build 300 steel underframe refrigerator cars in its own shops (Whipple Car Co.) at Chicago.

We quote, Chicago delivery, as follows:

Tank plates, ¼ inch thick, 6¼ to 100 inches wide, 1.58c to 1.63c. For extras, see Pittsburg report.

Store prices, f. o. b. Chicago, are as follows:

Tank steel, ¼ inch and heavier, up to 72 inches wide, 1.80c to 1.90c; from 72 inches to 96 inches wide, 1.90c to 2c; 3-16 inch up to and including 60 inches wide, 1.90c to 2c; 72 inches, 2.15c to 2.25c; No. 8, up to 60 inches wide, 1.95c to 2.05c. Flange quality and heads, 25c extra.

Sheets.—The local sheet interest was represented at the recent meeting of manufacturers at Pittsburg, and in conformity with the policy adopted, low prices prevailing earlier in the month have been withdrawn. Mill quotations in this territory are now made on a basis of 2.20c, Pittsburg, on black No. 28, and 3.20c, Pittsburg, on galvanized No. 28. As a result of firmer prices, however, business has fallen off temporarily and the local mill will probably close two or three of its 18 sheet mills this week. Store prices are being maintained in good shape.

We quote, store prices at Chicago, as follows:

Blue annealed No. 10, 2.10c to 2.20c; No. 12, 2.20c to 2.30c. Box annealed, No. 28, 2.75c to 2.85c. Galvanized, No. 28, 3.65c to 3.75c.

For mill prices, see Pittsburg report. Freight to Chicago, 18 cents.

Wire Products.—The agricultural demand for wire products is holding up with reasonable satisfaction. The volume of nails moving in this territory is somewhat less, although lower prices which are reported in the east, cannot be confirmed in this market.

We quote, f. o. b. Chicago, as follows:

Wire nails, jobbers' carload lots, $1.88; retailers' carload lots, $1.93; retailers' less than carload lots, $2.03; painted barb wire, jobbers' carload lots, $1.88; retailers' carload lots, $1.93; retailers', less than carload lots, $2.03; with 30c for galvanizing; plain wire to jobbers, $1.68; plain wire, retailers' carload lots, $1.73; staples, bright, $1.88.

Merchant Pipe and Tubes.—Pipe specifications are light and business in all sizes of black and galvanized merchant pipe is slow. It is customary, however, for the pipe trade to slack up perceptibly during the winter. Tube business is fair, but is not improving.

We quote iron and steel pipes and tubes, out of store, f. o. b. Chicago, as follows:

Iron and Steel Pipe Basing Price.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛-⅜ inch	68.2	53.2	62.2	47.2
½ inch	71.2	58.2	65.2	52.2
⅝ inch	76.2	65.2	71.2	60.2
4½-6 inches	73.2	62.2	69.2	58.2
7-12 inches	70.2	53.2	66.2	49.2
EXTRA STRONG PLAIN ENDS.				
½ inch	69.2	62.2	....	....
⅝ inch	74.2	67.2	....	....
¾ inch	64.2	....	....	....
DOUBLE EXTRA STRONG.				
½ inch	57.2	49.2	....	....
⅝ inch	62.2	54.2	....	....
¾ inch	52.2	40.2	....	....

Tubes.

	Lap weld steel.	Charcoal iron.	Shelby seamless.
	Per cent.	Per cent.	Per cent.
1 inch	..	..	57½
1¼ to 2¼ inch	50	35	35
2¼ to 5 inch	60	48	46

Cast Iron Pipe.—The leading pipe manufacturer reports a fair volume of small orders, but the market is devoid of large tonnages. Further developments from municipalities are hoped for later in the month.

We quote, f. o. b. Chicago, as follows:

Four-inch water pipe, $27; 6 to 12 inches, $26; larger sizes, $25; gas pipe, $1 a ton higher.

Old Material.—The market is without support. Heretofore the steel interests have been buying rather freely, which has maintained conditions on a fairly stable basis. The interest of the steel makers in the scrap market, however, has dwindled away, with the result that declines of from 25 cents to $1 a ton are noted generally throughout the list. One of the principal reasons for low scrap prices is that the material is being accumulated faster than it is being consumed. The Chicago, Milwaukee & St. Paul Railway disposed of 2,225 tons of scrap recently, the principal items being 700 tons of steel rails, 250 tons of frogs, switches and guards and 500 tons of No. 2 railroad wrought. The railroads have been offering scrap lists rather freely of late and while they have not realized any fancy prices, they have been quite successful in disposing of their tonnages.

We quote the market, f. o. b. Chicago, as follows:

GROSS TONS.

Old car wheels	$12.00 to 13.00
Old iron rails	15.50 to 15.75
Rerolling rails (5 ft. and over)	14.00 to 14.50
Old steel rails (3 ft. and under)	12.50 to 13.00
Frogs, switches and guards	12.00 to 12.50
Heavy melting steel	12.00 to 12.50
Shoveling steel	11.75 to 12.25

NET TONS.

No. 1 R. R. wrought	$11.50 to 12.00
No. 2 R. R. wrought	10.50 to 11.00
Arch bars and transoms	14.50 to 15.00
Knuckles, couplers and springs	11.50 to 11.75
Shafting	16.50 to 17.00
Iron car axles	18.50 to 19.00
Steel car axles	18.00 to 18.50
Locomotive tires	16.00 to 16.50
Dealers' forge	10.50 to 11.00
Pipes and flues	8.50 to 9.00
No. 1 cast, 150 lbs. and less	12.00 to 12.50
No. 1 busheling	9.50 to 10.00
No .2 busheling	7.50 to 8.00
No. 1 boiler cut	8.75 to 9.25
Boiler punchings	14.25 to 14.75
Cast and mixed borings	5.00 to 5.50
Machine shop turnings	6.50 to 7.00
Railroad malleable	11.00 to 11.50
Agricultural malleable	11.00 to 11.50
Stove plate and light cast scrap	11.00 to 11.50
Angle bars, splices, etc., iron	13.25 to 13.75
Angle bars, steel	11.25 to 11.75

Immense Ingot.—What is supposed to be the largest ingot of Krupp steel in the world was cast last week at No. 2 open-hearth mill at the Homestead plant of the Carnegie Steel Co. The ingot is 3 feet 4 inches high, 3 feet 8 inches wide and 4 feet 4 inches long and weighs approximately 135 tons. The ingot is one of a pair ordered by the United States government for a land fort on the Panama canal, and will be taken to the press shop of the armor plate works and pressed into a plate 18 inches thick.

CLEVELAND

Steel Plant Rumor Revived—New Buildings at Toledo.

Office of THE IRON TRADE REVIEW, Penton Building, Dec. 13.

Iron Ore.—The season which has just closed has been a very unprofitable one for vessel interests which do not have ore connections, and the outlook for next year is certainly not encouraging. It is not expected that any action in regard to ore prices will be taken at any time in the near future.

On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $5; Mesabi Bessemer, $4.75; old range non-Bessemer, $4.20; Mesabi non-Bessemer, $4.

Pig Iron.—As the time for taking inventory approaches, founders are not placing any new orders, but are delaying shipments as much as possible. Hence, the present condition is one of profound dullness. There is not enough business being done to test prices. We quote delivered in Cleveland for this year, as follows:

No. 1 foundry	$14.75
No. 2 foundry	14.25
No. 2 Southern	15.35
Gray forge	14.00
Bessemer	15.90
Lake Superior charcoal	18.00
Jackson Co. 8 per cent silvery	19.00

Coke.—The market is like that of pig iron in showing no life. Prices are practically stationary.

Connellsville furnace coke, $1.45 to $1.55 for prompt delivery, and $1.75 to $1.90 for first half next year. Connellsville foundry coke, $2 to $2.10 for prompt, and $2.25 to $2.50 for first half of next year.

Finished Material.—Rumors concerning the building of a steel plant in Cleveland have been renewed, and with more definiteness than heretofore. It is known that data concerning the desirability of building a steel plant in Cleveland are being prepared with much thoroughness by men connected with the iron business and others. They are highly gratified by the showing that is being made as to the amount of steel consumed annually in Cleveland, and also as to the advantage which Cleveland enjoys in regard to freight rates. Beyond getting information of this kind, however, nothing positive has been done. The structural material market in Cleveland is very quiet, as important building projects have not yet reached the contract stage. It is not expected that plans for the new Y. M. C. A. building will be ready in less than 30 days. The Ford Glass Co., Toledo, will receive bids next Monday on 1,100 tons of structural material for a part of its new plant. For the two high schools in Cleveland H. J. Spieker & Co. were awarded the contract for 500 reinforcing bars, the structural contract being awarded to the Toledo Iron Works. A new warehouse for the Woolson Spice Co., Toledo, will be erected by H. Bentley & Sons. The sheet market is much firmer as a result of the recent meeting in Pittsburg. A number of sheet manufacturers in the Mahoning Valley cities, who have long quoted prices f. o. b. their mills, are now quoting strictly on the Pittsburg basis.

Sealed bids for furnishing the materials and labor necessary for constructing the substructure of the new city hall will be received until noon, Dec. 21, at the office of the director of public service, 104 city hall, Cleveland. The only steel called for in the specifications consists of approximately 60 tons of reinforcing bars.

Old Material.—Extreme quietness prevails and very little material is passing even between dealers and brokers. A like condition is noted outside of this city, but in the Cleveland district prices appear to be no object to the buyers. Hence, we quote the following prices, largely nominal, f. o. b. Cleveland, gross tons:

Old iron rails	$15.50 to 16.50
Old steel rails (under 6 ft.)	13.50 to 14.00
Old car wheels	12.00 to 12.50
Old steel boiler plate	10.00 to 10.50
Malleable iron (railroad)	13.25 to 13.75
Steel axles	19.50 to 20.00
Malleable iron (agricultural)	11.50 to 12.00
Heavy steel	12.75 to 13.25
Country mixed steel	11.75 to 12.25

We quote, net tons, as follows.

No. 1 R. R. wrought	$12.50 to 13.00
No. 1 busheling	11.00 to 11.50
No. 1 machine cast	12.00 to 12.50
Axle turnings	9.00 to 9.50
Machine shop turnings	6.00 to 6.50
Grate bars	10.00 to 10.50
Pipes and flues	9.00 to 9.50
Tank iron	8.00 to 8.50
Sheet iron	4.00 to 4.50
Wrought drillings	6.00 to 6.50
Cast borings	6.00 to 6.50
Stove plate	10.00 to 10.50

CINCINNATI

Basic Inquiry From East—Coke Inquiries are Pending.

Pig Iron.—The usual inactivity incident to midwinter is again with us, and inquiries and sales have dwindled to almost absolutely nothing. Selling agencies complain of decrease in sales so far this month, and the situation is entirely featureless. Prices, however, do not indicate any change, and are quotable on the same basis as last week. Some fair sales are reported as having been made in St. Louis territory, but the local outlook is quiet. Two inquiries for basic from eastern concerns are now pending, one of which calls for 6,000 tons and the other for 3,000 tons. A northern Ohio melter is in the market for a small tonnage of high manganese iron. A central Ohio consumer is inquiring for 200 to 300 tons of foundry grades. Outside of these inquiries, there is little to report in the way of new business. A central western melter secured 1,000 tons of various grades of southern iron for December shipment, on an $11, Birmingham, basis. In addition to this might be mentioned a sprinkling of small lots, but the aggregate tonnage is below what it usually is. Special and silvery irons are quiet and the demand for the lower grades has abated materially. Selling agencies hold out little hope for betterment until the opening of the year, and it may be even later before the pendulum will begin to swing the other way.

We quote prices for this year and through the first half of next year, based on freight rate of $3.25 from Birmingham, and $1.20 from Ironton, as follows:

	1910.	First quarter, 1911.
Southern foundry No. 1	$14.75	$15.25
Southern foundry No. 2	14.25	14.75
Southern foundry No. 3	13.75	14.25
Southern foundry No. 4	13.75	14.25
Southern No. 1 soft	14.75	15.25
Southern No. 2 soft	14.25	14.75
Southern gray forge	13.75	14.25
Northern No. 1 foundry	15.70	15.95
Northern No. 2 foundry	15.20	15.45
Northern No. 3 foundry	14.70	14.95
Jackson county 6 per cent silicon		18.20
Jackson county 8 per cent silicon	19.20	19.70
Jackson county 10 per cent silicon		20.20

Coke.—Several of the furnace inquiries noted a week since are still pending. Aside from these, furnace demand is light and featureless. Some prompt foundry coke is being moved, but there is little new business. Prices are said to be about the same as last week, and from the leading coke producing districts are as follows:

Connellsville district:	Prompt Shipment.	During year.
Foundry coke	$2.00 to 2.25	$2.25 to 2.50
Furnace coke	1.50 to 1.60	1.75 to 1.85
Wise county district:		
Foundry coke	2.00 to 2.25	2.15 to 2.25
Furnace coke	1.50 to 1.65	*Sliding [scale basis.
Pocahontas district:		
Foundry coke	2.10 to 2.25	2.10 to 2.25
Furnace coke	1.65 to 1.75	1.75 to 1.85
New river:		
Foundry coke	2.50 to 3.25	2.60 to 3.25
Furnace coke	2.20 to 2.30	2.20 to 2.30

*Sliding scale basis means $1.60 for coke based on $9, Birmingham, for pig iron, with an advance of 16 2-3 per cent of the amount over $9 at which pig iron is quoted. This is the usual basis. Other forms of sliding contracts are also made.

Finished Material.—Plates, shapes and bars are quotable at 1.40c, Pitts-

burg. Some of the smaller independent plate mills are said to be taking tank plate at 1.35c. Steel bars and bolts have been fairly active during the week, and contract specifications have improved somewhat. The majority of buyers do not appear to be placing any but urgent orders owing to the unsettled condition and uneasiness as to what turn the market will take. A little better inquiry is reported from railroads which may indicate that they will come into the market before long.

Old Material.—Aside from the usual contract business booked, dealers say that trade is dull and quiet. The mills are only fairly busy, and are unwilling to increase their orders. Prices are irregular and subject to considerable fluctuation, and according to dealers are about as follows:

Old No. 1 R. R. wrought, net tons	$10.50 to 11.00
No. 1 machinery, net	10.00 to 10.50
No. 1 busheling, net	10.00 to 10.50
Old iron rails, gross	16.00 to 16.50
Old steel rerolling, gross	15.50 to 16.00
Old short lengths, gross	14.50 to 15.00
Old iron axles, net	18.00 to 18.50
Heavy melting scrap, gross	11.00 to 11.50
Stove plate, net	8.00 to 8.50
Heavy turnings, net	6.00 to 6.50
Cast borings, net	4.50 to 5.00
Car wheels	13.00 to 13.50
Grate bars	8.50 to 9.00

PHILADELPHIA

Pig Iron Buying by Pipe Makers—Railroad Inquiry.

Dec. 12.

Pig Iron.—Except with the eastern cast iron pipe makers, who have been buying quite freely of late for first quarter shipment, there is little business of the tonnage order moving in this market. A fair run of small orders continues to be entered, but these are not sufficient to give conditions any appearance of activity and the market is following a quiet and rather uneventful course. Because of the approach of the holiday season, such a situation is expected to show little change within the next several weeks. Of the pipe iron bought the past week, one of the leading consumers of this territory closed for 5,000 tons of northern forge for first quarter on a basis of $14.25 delivered. This interest has bought a round tonnage of such iron during the past several weeks, picking it up in different directions, north and south. Another prospective order of this sort calls for 6,000 tons for forward delivery. Some reports of exceedingly low prices being quoted on standard Lehigh and Schuylkill valley hands have been in circulation, especially in New York, but these appear to be unfounded. Small sales of No. 2X from these districts at $15.75 and in a few cases at $16 and of No. 2 plain at $15.30 delivered are noted. The prevailing prices of standard Lehigh and Schuylkill valley irons seem to be included in the quoted price of $15.50 to $15.75 delivered for No. 2X, though some other eastern brands are obtainable below this level. One nearby consumer is out for 1,500 tons of foundry grade for first quarter. A small increase in stocks in Virginia territory, which are now about 225,000 tons, was reported at the monthly meeting of the Virginia Pig Iron Association the past week, but there was also a favorable increase in orders booked. Most Virginia makers are holding for $13 furnace for No. 2X, but some brands and odd lots are still available as low as $12.50 furnace. Prospective basic buyers continue to offer around $14.25 delivered, but no makers are willing to consider such a figure. There is no active inquiry in the market. Some small sales of standard low phosphorus on the basis of $22.50 Philadelphia, are reported, the total being less than 1,000 tons. For prompt and first quarter shipment, we quote as follows:

No. 1X foundry	$16.00 to 16.25
No. 2X foundry	15.50 to 15.75
No. 2 plain	15.00 to 15.50
Standard gray forge	14.25 to 14.75
Basic	14.50 to 14.75
No. 2X Virginia	15.80 to 16.30
No. 2 Southern	15.00 to 15.50
Low phosphorus	22.50

Finished Material:—General good-sized prospects of a definite nature and some business placed have inspired some hopes that a better tonnage will shortly be forthcoming from the railroads. This is the only development of any importance in this market, as otherwise conditions appear quiet generally. Plate makers have received better volume of orders from boiler shops this week.

In the railroad line, the Norfolk & Western has placed 3,500 tons of bridge work with the Pennsylvania Steel Co. and is having sent some large inquiries for additional work for which 7,000 tons of plates and about the same quantity of shapes are asked. Some of the business has previously been referred to. The Chesapeake & Ohio railroad is putting out requirements for 2,000 to 4,000 steel underframes for cars which will call for 4,000 to 8,000 tons of steel. The Philadelphia & Reading railroad is expected to soon award considerable additional tonnage for its improvements in this city and the Pennsylvania railroad has placed a few bridges in the east and is shaping others for contracts. Two railroad systems have inquiries out for more than 200 locomotives. The general contract is being placed this week for the new building of the Packard Motor Car Co., this city, requiring 1,000 tons, of which 800 tons are Bethlehem sections. A new factory for Alexander Bros., leather manufacturers, this city, calling for 400 tons is up. Action is expected soon on the Baltimore Bargain House, 3,000 tons, now pending.

Considerable tonnage is involved in government contracts. Bids were taken this week on the steel material consisting of 10,500 tons of shapes and plates and 2,200 tons of protective deck plating in addition to the armor plate, required for the battleship under the recent act to be built in the government navy yards. Figures also went in for 500 tons of fabricated steel for anchorages at the Panama canal. Bids will be taken Jan. 15 on the revised plans for the new departmental building for printing and engraving at Washington, which it is variously estimated will require from 2,000 to 4,000 tons.

Billet sales are light and tonnages causing sharp competition are few. Prices are somewhat irregular, but scarcely any weaker.

We quote for delivery in Philadelphia and vicinity as follows:

Structural shapes, 1.50c to 1.55c; steel bars, 1.55c to 1.60c; iron bars, 1.32c to 1.37c; 4 x 4-inch open-hearth rolling billets, $25 to $25.50, eastern mill; forging billets, $27 to $27.50, eastern mill.

Coke.—One eastern furnace interest has just closed for a moderate tonnage of furnace coke for first half. A large eastern steel interest which has been negotiating for some time still has open the proposition of covering its yearly requirements for a group of furnaces, which will amount to 50,000 tons or more monthly. The better grades of Connellsville furnace coke are quoted in the east around $1.70 ovens with some hands holding as high as $1.85 ovens.

Old Material.—The low stage of prices continues to stimulate some interest of eastern consumers in the tonnage grades in moderate-sized lots, as actual needs are well covered. Some heavy steel is moving in this way, usually in 1,000 tons and less, but the buyer has signified a willingness to take in a large tonnage for well distributed deliveries around $12.50, the minimum of the market. There is a fair demand for cast, but the available supply on the market is not so large. Borings and turnings seem a little weaker and there are cases of con-

tracts at $8.50, delivered, being cancelled by buyers for non-delivery within the specified time. Wrought scrap is dull. Philadelphia dealers obtained some of the Pennsylvania awards this month at lower prices, but the bulk went to consumers direct. The Southern railway is offering about 2,000 tons, which represents two or more months' accumulation. We quote gross tons, delivered in eastern Pennsylvania consuming territory, as follows:

Old steel rails (re-rolling)	15.75 to 16.25
Heavy melting steel	12.50 to 13.00
Old car wheels	13.75 to 14.25
Old iron car axles	25.00 to 26.00
Old steel car axles	20.00 to 21.00
No. 1 railroad wrought	16.00 to 16.50
Wrought pipe	12.75 to 13.00
Cast borings	8.25 to 8.50
Heavy cast scrap	14.00 to 14.50
Railroad malleable	13.50 to 14.00
Wrought turnings	8.25 to 8.50
Stove plate	10.50 to 11.00

NEW YORK

Structural Prices Left Unchanged—Quiet Iron Market.

Office of THE IRON TRADE REVIEW, 1115 West Street Bldg., Dec. 13.

Iron Ore.—The one or two instances wherein there has been any interest shown by eastern furnaces in next year's foreign ore have disclosed delivered prices of at least half cent a unit over that which prevailed on the same grades this year. This is due both to higher asking prices by miners and advanced ocean freights. The block of low grade Canadian ore reported last week as having been negotiated for next year by one eastern iron maker, was sold at about 8 cents a unit, delivered, to the furnace, which is considered a favorable price for the seller. A well-known African Bessemer ore is being quoted at an advanced price for next year and an advance of about one-half cent a unit over this year's selling level has been made in a well-known Canadian ore, but there has been no effort made to book any contracts, because ore is still under contract, which will be carried over into next year. Subject to delivery being made this month, the sale of 6,000 to 8,000 tons of Newfoundland ore is noted.

Pig Iron.—Quietness still permeates the pig iron market in this territory and the volume of business entered the past week has been light. Where makers have adjusted prices in particular cases to the ideas of buyers, some fair tonnages have been quietly booked. Sales of 1,500 tons, 1,200 tons and smaller lots, chiefly for first quarter delivery, have come under this class of business this week. A number of the furnaces, however, will not deviate from their announced schedules and are contenting themselves with picking up the routine business, which is largely a few hundred tons and less. The General Electric Co. has closed under its recent inquiry on its first quarter requirements for Schenectady, estimated at 2,000 to 3,000 tons. The business went to Buffalo makers. It is still negotiating for about 1,800 tons of foundry iron and about 1,500 tons of low phosphorus for its Lynn, Mass., plant, as it is now established that the reported purchase of the latter grades is premature and the business is still pending. A Jersey buyer took 500 tons of low grade iron for deliveries running through first quarter from eastern Pennsylvania furnaces. A Newark interest closed for 300 tons of malleable at about $15.75, delivered, presumably obtaining the iron from valley furnaces. An up-state buyer has put out a new inquiry for 2,000 to 3,000 of No. 2X for January and February, and a New Jersey shop is out for 1,500 of foundry grades for first quarter. A railway equipment manufacturer has revived an inquiry for 500 tons of malleable for up-state shipment. The recent aggressive selling by one Virginia furnace to clean up its yards, which it did at very low prices in some cases, has left its effect upon that market, where the previous general level of $13.00, furnace, for No. 2X can now be shaded about 25 cents in some directions. New England business is in small sales at about $16.25, delivered, for No. 2X, though this figure has been considerably shaded by the aggressive Virginia furnaces. We quote, for prompt and first quarter shipment, as follows:

Northern foundry No. 1	$15.75 to 16.00
No. 2X foundry	15.50 to 15.75
No. 2 plain	15.00 to 15.25
No. 2 Virginia	15.50 to 15.80
No. 2 southern foundry	15.25 to 15.75
Malleable	15.75 to 16.25
Gray forge	14.25 to 14.50

Ferro-Alloys.—The market in ferro-manganese is quiet. To all appearances $38.50, seaboard, represents the present minimum, though consumers are trying to shade this price. About 500 tons of 50 per cent ferro-silicon continues under negotiation. Prices of this alloy are firm. We quote 80 per cent ferro-manganese for prompt and forward shipment at $38.50 to $38.75, seaboard, and 50 per cent ferro-silicon at $56.00 to $56.50, Pittsburg.

Cast Iron Pipe.—The season is at hand when municipal lettings are less numerous. Otherwise the market shows little change. Low prices still prevail. The Standard Cast Iron Pipe & Foundry Co. took 1,500 tons for New Bedford, Mass., at $21.38, delivered, and R. D. Wood & Co., 680 tons for South Hadley, Mass., at $22.35, delivered. Of the recent Hartford, Conn., order the leading interest took 200 tons, and 1,600 tons went elsewhere. The leading interest has also booked less than 200 tons for E. Orange, N. J. Under present plans, a large tonnage of cast iron pipe will be required for the completing section of the Catskill aqueduct through metropolitan boroughs, for which construction bids will be taken Dec. 24. This work involves fully $20,000,000 expenditure. The pipe requirements, however, will not be called for for about a year. We quote 6-inch pipe at from $21.00 to $21.50, f. o. b. New York, in carload lots.

Rails and Track Material.—Some confusion has arisen in the negotiations between the railroads and the mills over the 100-pound price basis for rails, put in effect by makers this year. In some cases this has delayed orders somewhat. Rail makers met in New York, Monday, and considered the more stringent specifications of the Pennsylvania railroad upon its recent 150,000-ton allotment. This matter will probably be adjusted in due season. The Delaware & Hudson railroad has a new inquiry out for 7,500 to 10,000 tons, the bulk of which will probably go to the Bethlehem Steel Co. The 5,500 tons reported for the New York, Westchester & Boston is a part of an old inquiry from this line, which has been before the market for many months. Other rail negotiations continue under way.

Finished Materials.—Makers of structural material held a meeting in New York, Monday, and canvassed the situation in their branch of the industry. While it developed, as has been reported, that there has been some shading of prices, more noticeably in the east, the opinion was generally expressed that the 1.40c, Pittsburg, price was being faithfully upheld, except, possibly, to the very largest buyers. It was the opinion of the mills represented that any reduction in prices at this time would bring no beneficial results because of the limited business pending. Accordingly, no action was taken in this direction.

Bridge work offered or awarded by the railroads continues light. As reported from Philadelphia, the Pennsylvania Steel Co. has taken 3,500 tons for the Norfolk & Western, and in addition has 1,700 tons for the Pennsylvania railroad, consisting of a small jump-over bridge at Harrison, N. J., and a larger swing span on the New York division. The Virginian railroad has placed 2,400 tons with the Virginia Bridge & Iron Works. The Norfolk & Western has a considerable tonnage of bridge work pending, estimated as exceeding 10,000 tons and is also reported to be figuring upon considerable tonnage for underframes. The Chesapeake & Ohio and

the Southern railroads also have tentative orders for car material in view. The Boston & Maine is inquiring for 300 tons for three small bridges.

The Thompson-Starrett Co. is taking figures on the steel requirements for the Insurance Exchange building, Chicago, 10,000 tons or more, and for the McAlpin hotel, New York City, also approximately 10,000 tons. It is now established that the McClintic-Marshall Construction Co. has the 2,500 tons of the Washington Irving School in Brooklyn. Other contracts of the week include 700 tons to the New England Structural Co. for the Bigelow building, Boston, and 400 tons to Levering & Gerrigues, for alterations of the plant of the New York Edison Co. Levering & Gerrigues will also probably get 600 tons for the Sacramento, Cal., court house, and it is expected that Dyer Bros. will receive 950 tons for the Lowell School, San Francisco. The United States Appraisers building, Boston, which will require 2,000 tons, is up. Bids are going in this week on 3,500 tons for the new state prison near Dover, N. Y., but the contract is not attractive since it is spread over three years. About 2,000 tons additional will be required for cell work.

We quote, New York delivery, as follows: Angles, 3 to 6 inches x ¼ inch and heavier, 1.56c to 1.61c; beams, 3 to 15 inches, 1.56c to 1.61c; tees, 3 x ¼ inch and heavier, 1.56c to 1.61c; plates, carload, tank, 1.56c to 1.61c; boiler steel, 1.66c to 1.71c; marine boiler, 1.96c to 2.01c; bar iron, 1.34c to 1.37c; soft steel bars, 1.56c to 1.61c.

Old Material.—Considerable heavy steel has recently been moved from New York territory to apply upon old contracts so that there is not a great deal of this material now to be had at current prices. The market, however, shows limited new business and the activity in any grade is principally on shipments against old contracts. The current market on borings and turnings is easier, but as high as $8.50, delivered in eastern Pennsylvania, has been paid by dealers to apply upon higher-priced sales, made some time ago. About 600 tons of Panama scrap was disposed of by the government in this market this week. We quote gross tons, prices New York dealers will pay at tidewater, with the exception of cast scrap, which has a local demand, as follows:

Old car wheels	$12.00 to 12.50
Old iron axles	22.50 to 23.00
Old steel shafting	16.50 to 17.00
Heavy melting steel	10.50 to 10.75
No. 1 R. R. wrought	13.00 to 13.50
Iron track scrap	11.50 to 12.00
Wrought pipe	10.00 to 10.50
Cast borings	6.75 to 7.00
Wrought turnings	6.50 to 7.00
Heavy cast scrap	12.50 to 13.00
Railroad, malleable	12.50 to 13.00
Stove plate	9.00 to 9.50
Grate bars	9.00 to 9.50

ST LOUIS

Small Lot Sales of Pig Iron—Bar Iron Sold at 1.25c, Mill.

Dec. 12.

Pig Iron.—Actual transactions in pig iron have been scarce in St. Louis territory for some time. These inquiries have been pending for weeks: Four hundred tons of southern No. 2; 600 tons of southern Nos. 2 and 3; 300 tons of northern; 1,000 tons of southern foundry; 600 tons of analysis iron, of which 200 would grade about No. 2 and 400 No. 3. An inquiry for 700 tons for a Quincy, Ill., stove maker came out this morning. Even small-lot sales have been few in the last five or six days. One sale of about 1,600 tons of foundry iron is reported to have been made for delivery in an Illinois town across the river from St. Louis. Southern No. 2 is readily obtainable at $11 for delivery over the first quarter. For second half delivery, there is no trouble in getting southern No. 2 at $11.50, and very little doubt that an $11 price could be obtained for that delivery. Northern iron is in little demand at $14 to $14.50. Prices delivered for southern No. 2, to which the Birmingham freight of $3.75 has been added, follow:

Southern No. 1	$15.50 to 16.00
Southern No. 2	15.00 to 15.50
Southern No. 3	14.50 to 15.00
Southern No. 4	14.00 to 14.50

Coke.—An order for 15 cars of foundry coke was placed last Saturday, and another one is out that will total 35 to 40 cars of the same grade. With this exception, business has been confined to small sales, for quick delivery. Prices remain as follows:

We quote 72-hour Connellsville foundry grades, $2.35 to $2.50 for whole of 1911; 72-hour foundry, $2 to $2.25, on tracks and for immediate delivery; 48-hour Connellsville furnace, $1.60 to $1.85; best 72-hour Virginia foundry, $2 to $2.35; 48-hour Virginia furnace, $1.60 to $1.85. The freight to East St. Louis and St. Louis is $2.80, and $2.70 from the Virginia fields when shipment is destined beyond St. Louis.

Finished Material.—Quite a number of plans for steel frame office structures and bridges, all of which will fall to St. Louis for delivery of material, are in the hands of architects. Some of the work will be constructed as far away as central Texas, but the plans and material will be furnished out of St. Louis. Bar iron is understood to have been sold at about 1.25c, mill, for delivery in this market and almost into Chicago.

Old Material.—Business in scrap iron is positively stagnant, with prices having dropped to the following nominal basis:

Old car wheels	$13.50 to 14.00
Old iron rails	14.50 to 15.00
Rerolling rails (4 ft. and over)	13.00 to 13.50
Old steel rails (2 ft. and under)	12.00 to 12.50
Light section relayers, 45 lbs. and under, subject to inspection	21.00 to 23.00
Relaying rails, subject to inspection	24.50 to 25.00
Frogs, switches and guards	12.00 to 12.50
Heavy melting steel	12.00 to 12.50
Shoveling steel	12.00 to 12.50

We quote, net tons, as follows:

No. 1 R. R. wrought	$11.50 to 12.00
No. 2 R. R. wrought	10.50 to 11.00
Arch bars and transoms	14.00 to 14.50
Knuckles, couplers and springs	12.00 to 12.50
Shafting	15.00 to 15.50
Iron car axles	18.50 to 19.50
Steel car axles	18.50 to 19.50
Locomotive tires	14.50 to 15.00
No. 1 country wrought	9.50 to 10.00
Pipes and flues	9.00 to 9.50
No. 1 cast, 510 lbs. and less	12.00 to 12.50
No. 1 busheling	10.25 to 10.75
No. 2 busheling	7.00 to 7.50
No. 1 boiler cut	9.00 to 9.50
Boiler punchings	10.25 to 10.75
Cast and mixed borings	5.00 to 5.50
Machine shop turnings	7.00 to 7.50
Railroad malleable	10.00 to 10.50
Agricultural malleable	9.00 to 9.50
Stove plate and light cast scrap	9.50 to 10.00
Angle splice bars, iron	13.25 to 13.75
Angle splice bars, steel	12.00 to 12.50

BUFFALO

New Construction Planned—Pig Iron Market is Dull.

Buffalo, Dec. 12.

Pig Iron.—There has been very little call for iron during the last week, and the production of furnaces in this district still remains comparatively light. What business there is has been in small lots ranging from a car load to 500 tons. Inquiries are light and the volume of business under negotiation has fallen off somewhat. An electric concern which had inquiries in for a sizable tonnage is reported to have bought out of the district. The furnace interests say that they are still holding to the schedule of prices agreed upon some time ago, and that there will be no reduction.

No. 1X	$15.00 to 15.50
No. 2X	14.50 to 15.00
No. 2 plain	14.50 to 14.75
No. 3	14.50 to 14.75
Gray forge	14.00 to 14.50
Malleable	14.50 to 15.00
Basic	14.50 to 15.00
Charcoal	17.75 to 18.25

Finished Products.—All lines of finished products are decidedly dull this week. This is partly attributed to the fact that a good many buyers are taking inventory, and it is expected that business will remain quiet until after Feb. 1, when some improvement is looked for. No important lettings are reported, although a few sizable jobs are pending. The New York Central is taking figures for a viaduct to be built in connection with improvements at the Gardenville yards

which will require about 900 tons. Plans are being prepared for a four-story addition to the rear part of the Iroquois hotel, of which Wooley & Gerrans are owners. A trolley line is contemplated between Jamestown and Dunkirk, and among those interested is A. M. Broadhead, of Jamestown. In spite of the dullness prices are being maintained and the falling off in business is taken care of by decreased production.

Old Material.—The scrap market shows no improvement and no important sales are reported this week. Prices here given are largely nominal. We quote, gross tons, f. o. b. Buffalo, as follows:

Heavy melting steel	$12.25 to 12.50
No. 1 railroad wrought scrap	14.50 to 15.00
No. 1 railroad and machine cast scrap	13.50 to 14.00
Old steel axles	17.00 to 18.00
Iron axles	23.00 to 24.00
Car wheels	13.75 to 14.25
Railroad malleable scrap	13.75 to 14.00
Machine shop turnings	6.75 to 7.00
Cast iron borings	5.00 to 5.50
Low phosphorus steel scrap	17.00 to 17.50
Old iron rails	15.50 to 16.00
Tank iron	10.75 to 11.00
Sheet iron	6.50 to 7.00
Stove plate	12.00 to 12.50
Pipes and flues	10.25 to 10.75
Grate bars	11.50 to 12.00
Boiler plate	11.00 to 11.50

Price Concessions in Pig Iron—Hoping for Better Conditions.

Birmingham, Ala., Dec. 12.

Pig Iron.—There is nothing in market conditions to indicate satisfaction. Sales the past week were scattering and of small tonnage lots. Concessions from the $11.50 per ton price are heard of for first and second quarter delivery—though a number of the furnace interests of the district stoutly deny such concessions on their part. For prompt shipment, or delivery the early part of next year, $11 per ton at the furnace is quoted. Several inquiries are recorded from large buyers—evidently sounding the market—on round tonnage lots at a shade better than $11, but they have been turned down. With the approach of the holidays, a natural lull is expected. Manufacturers of all kinds ordinarily count on their employes taking from five to ten days during the holiday period, and for that reason are not urging that shipments be rushed. This is particularly true with the small melters of the country. Naturally everyone looks forward to better conditions after the first of the year, but there is nothing particularly encouraging in the pig iron market to warrant such a feeling. In the interim, conditions may be so adjusted as to bring about a healthy buying movement on the part of the railroads—which line of business seems to be the center of attraction at present in the way of a panacea for the general business condition of the country.

Cast Iron Pipe.—There are no developments in the water pipe markets. Manufacturers continue to book the regular hand-to-mouth business, which has kept them going for some months past. It is getting along close to inventory time, and it is understood that unless conditions materially improve in the meantime some of the plants will be out longer than usual in adjusting these matters. The following prices are quoted, per net ton, f. o. b. cars here:

4 inches to 6 inches	$19.00 to 19.50
8 inches to 12 inches	18.50

Old Material.—The same drag that has characterized the scrap market for many months past continues. Only nominal quotations are quoted, which are as follows per gross ton, f. o. b. cars here:

Old iron rails	$13.50 to 14.00
Old steel axles	16.50 to 17.00
Old iron axles	17.00 to 17.50
No. 1 R. R. wrought	11.50 to 12.00
No. 2 R. R. wrought	10.50 to 11.00
Dealers' wrought	10.00 to 10.50
Old steel rails	11.00 to 11.50
No. 1 machinery	10.00 to 10.50
No. 1 steel	10.00 to 10.50
Old standard car wheels	12.50 to 13.00
Light castings, stove plate	8.50 to 9.00

BRITISH IRON MARKET.

Stocks Decreased, But Business Appears Encouraging.

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Nov. 30.

General steadiness in the pig iron trade has been manifest since Saturday, and on the mere rumor, which proved to be unfounded, of a settlement of the boilermakers' labor troubles, the market became firmer yesterday, with a little recovery in prices. In spite of continued increases in stocks, which now stand at 507,400 tons, prices continue firm. Yesterday's selling price was 49s 9d ($12.18) cash for No. 3, with 50s 1d ($12.26), and 50s 9d ($12.42). Since the beginning of the month, 21,000 tons have been added to stocks in spite of fairly good shipments. Political excitement has now been added to labor troubles, and business tends to ease off a bit. East coast hematite makes a rather better market than ordinary pig iron. Mixed numbers for December delivery are quoted 63s 6d ($15.54), with 64s 6d ($15.78) first quarter next year. There is very little buying of ore at the present time.

In the finished iron and steel department, a remarkably heavy output is being maintained. Makers of steel are very firm as to price and show great confidence in the future. In the Middlesbrough district, there is increasing activity, although prices do not show a corresponding increase. Some very handsome orders have been booked lately by Derbyshire firms. Northeastern business continues to be affected by the shipyard trouble, although prices are steady.

GERMAN IRON MARKET.

While Raw Material Advances, Finished Market Weakens.

Dusseldorf, Nov. 30.

Although raw material, such as iron ore, coke and scrap, is becoming dearer yet prices of iron and steel products are not only weaker, but some of them also show actual reductions. Bar iron especially shows further declines and pig iron prices are becoming irregular in spite of the official quotations of the new pig iron syndicate. While sellers indicate more willingness to meet buyers yet the amount of business so far done for 1911 delivery is still very small. Improvement in export business is noted, but only in quantity moved and not in the prices obtained. This improvement in exports is ascribed to the recent increase in the sea freight to the Far East, Japan, China, etc., and the expectation is that freights will be further increased.

Orders for railway materials are coming forward more freely and works have enough orders booked to insure operation until March 1. The last report of the Stahlwerksverband notes somewhat of a record in deliveries of railway material. Although coke is firmer at advanced prices, yet much disturbance of the German coal market is seen. For due to the mild weather so far the consumption of coal has not been what was expected and the enormously growing output is largely in excess of demand. The fuel coal position is especially unfavorable in the south of Germany where Westfalian coal of the syndicate and of the outsiders is fighting the Saar coal from the Fiscal mines as well as English coal. In some cases reductions in price of marks per ton have been made to get business and no improvement is yet in sight. Because of very cheap German river freight rates, English coal can be carried at a profit far inland.

METAL MARKETS

St. Louis.

Dec. 12.

Lead and Zinc.—A top price of $49 a ton for zinc blende was realized in the Missouri-Kansas-Oklahoma district last week on an assay base of $46, which ranged down to $42 for 60 per cent qualities. Not much ore was sold at $46.

St. Louis spelter also manifested weakness, selling at 5.70c at the close of the week, compared to 5.85c the week before. Calamine brought a top price of $30 a ton on an assay base of $26, ranging down to $24 for 40 per cent grades. The average price paid for all grades of calamine was $24.24, compared to $26.24 the week before.

Lead ore sold for $56 a ton, with an average price of $55.38, compared to $54.65 the previous week. Pig lead at East St. Louis was quoted at 4.40c, compared to 4.37½c the week before.

New York.

Dec. 13.

Copper.—The statement issued Dec. 8, by the Copper Producers' Association made a favorable impression in the trade. Production decreased 7,115,821 pounds in November, compared with October, and stocks held in first hands decreased 8,872,845 pounds, reducing total stocks in the United States to 130,339,069 pounds. Consumers of copper metal being fairly well supplied with raw material for the remainder of the year have not bought heavily by way of expressing their satisfaction, however. Notwithstanding the light volume of buying done this month, prices have been well maintained; the leading sellers holding their asking price for electrolytic firm at 13c, delivered 30 days. Lake copper is still being offered at 13c.

Tin.—Further evidence of the syndicate's complete control of the pig tin situation, was shown, Monday. In the almost total absence of consumptive buying prices were run up to £176 15s for both spot and three months, in London, and to 38.70c for spot, in New York. Reports indicate that little opportunity prevailed in either market to unload syndicate stocks upon consumers. Statistically the tin situation continues strong. However, high prices may operate to restrict consumption. Arrivals of tin since Dec. 1, aggregate 1,180 tons and there are 1,068 tons afloat.

Lead.—The price of pig lead is unchanged in New York. Outside interests continue to ask from 2½ to 5 points above the price of the American Smelting & Refining Co., which is quoting 4.50c for shipment lead. The volume of business is only fair.

Spelter.—Shading of the leading seller's quotations has been extensive during the week by dealers and small producers. The former, however, are not pressing sales, and seem content to let the market drift at present, feeling that in the near future it will come back to their level. The prevailing price in New York is 5.85c.

Antimony.—Business in antimony is stagnant and prices weak. Cookson's is 7.75c, Hallett's is 7.62½c, and Hungarian is 7.25c.

Chicago.

New Metals.—In spite of dull business in the iron and steel market, copper remains fairly strong and demand reasonably good. Quite a little copper is being sold for immediate delivery and there is some interest in 1911 requirements. Lake copper is being firmly held at 13⅛c and casting copper is quotable at 12⅞c to 13c, Chicago. The demand for spelter is light and prices have again been shaded. Ruling quotations are now 5.80c to 5.85c, Chicago, a decline of 10c during the past week. Ruling quotations on lead remain at leading interest's price, 4.45c, although independent smelters are cutting down these quotations. Tin is strong.

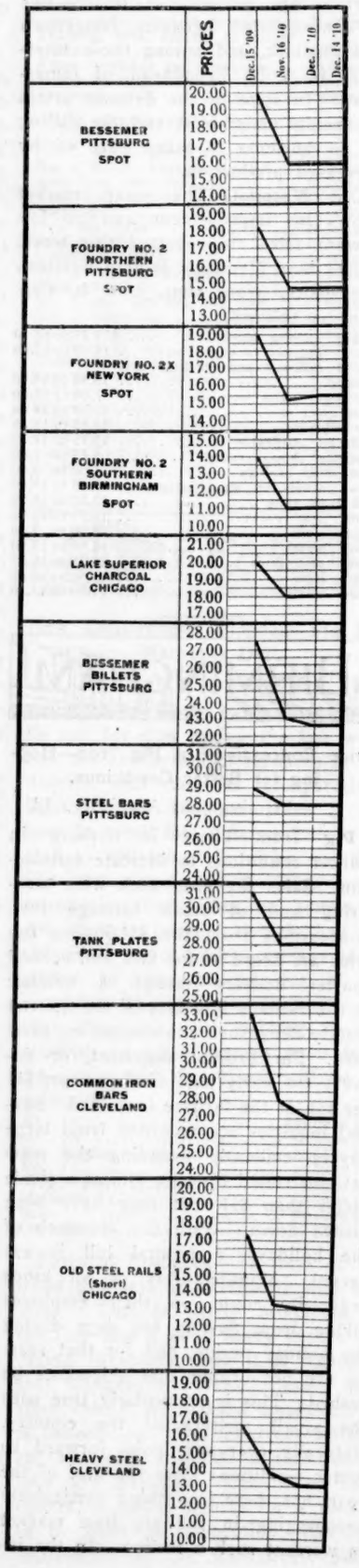
We quote, dealers' selling prices, f. o. b. Chicago, as follows:

Lake copper, carload lots, 13⅛c; casting, 12⅞c to 13c; smaller lots, ¼c to ⅜c higher. Spelter, car lots, 5.80c to 5.85c; lead, desilverized, 4.45c, in 50-ton lots; corroding, 25c per 100 pounds higher; sheet zinc, $7.75 list, f. o. b. La Salle, in car lots of 600-pound casks; pig tin, 39¼c; Cookson's antimony, 10½c; other grades, 9c to 10c.

Old Metals.—The market is quiet, although tin scrap is somewhat stiffer. There is very little business going, hardly enough to test the market. Brass is quiet and copper stationary.

We quote, dealers' selling prices, f. o. b. Chicago, as follows: Copper wire, 11¼c; heavy copper, 11¼c; light copper, 10½c; heavy red brass, 10⅜c; heavy yellow brass, 8c; light brass, 6¼c; No. 1 red brass borings, 9¼c; No. 1 yellow brass borings, 6½c; brass clippings, 8c; tea lead, 3.80c; lead scrap, 4¼c; zinc, 4¾c; tin pipe, 32.5c; tin foil, 29.5c; pewter, 23.5c; electrotype plates, free from wood, 4½c; electrotype dross, 3c; stereotype plates, 4½c; stereotype dross, 3¼c; linotype dross, 3¼c; prime slab zinc dross, $85 per ton.

PRICE CHART



RAIL BUSINESS

May be Larger than Expected—Developments Slow.

New York, Dec. 14. (By wire.)

In some well informed sources, the opinion is expressed that present negotiations indicate that the total rail business next year will be large and may exceed the present year. Some leading systems are figuring upon larger tonnages than expected, but definite developments are slow. The Illinois Steel Co. reports 1,000 tons for the Union Pacific and 500 to a frog interest. The Carnegie Steel Co. has sold 1,500 to the Clarion & East Brady Electric Railway.

The Pennsylvania post office building in this city, 6,400 tons, will be refigured, as former bids were rejected. Eastern mills have been quoting bar iron 1.34c, New York.

EMINENT INVENTORS FORM A GUILD.

An inventors' guild has been organized in New York for the purpose of simplifying and improving the patent laws of the United States. The membership of the guild embraces the leading inventors of the United States, While the membership is numerically small, every large city is represented. The officers of the society are: Ralph D. Mershon, consulting engineer, president; Charles W. Hunt, inventor of coal-handling machinery, vice president; Thomas Robins, inventor of conveying belts, secretary; Henry L. Doherty, inventor of gas-making machinery, treasurer; Peter Cooper Hewitt, inventor of the mercury vapor lamp, and Prof. Michael I. Pupin, of Columbia university, are on the board of governors. Thomas A. Edison, of New York, and Alexander E. Brown, of Cleveland, are members.

STILL UNSETTLED.

Chicago, Dec. 13.

After a vigorous debate, the city council last night put over for further consideration the recommendation of the building committee, that a temporary ordinance be passed, limiting the height of tall buildings to 260 feet, until the committee is ready to make a final report as to whether the limit shall be 200 or 260 feet.

Broke His Jaw.—A crane man employed by the Smith & Watson Iron Works, Portland, Ore., was attacked by two pickets from the machinists' union, Friday evening, Dec. 2, just in front of his home, and sustained a broken jaw. The thugs were arrested, but gave bail amounting to $500 each. This crime is one of the most serious of a number of petty assaults which have characterized the labor troubles in Portland recently.

MAY HOLD UP GUN CONTRACTS.

Not only have the recent battleship awards been held up by the government, but the lower price quoted by the bureau of ordnance, war department, seems to indicate that the Midvale and Bethlehem Steel companies will fail to receive the awards for the 14-inch guns and gun mounts which they won in open competition, Dec. 3. The war department has announced that it can build this ordnance at the Watervliet arsenal for an amount considerably less than prices quoted by the bidders, as announced in *The Daily Iron Trade Review*, on Dec. 6.

EXPORTING PIG TIN.

The Tennessee Coal, Iron & Railroad Co. has just completed shipment of 1,000 tons of pig iron to Genoa, Italy. The shipment was made from a southern port.

An Old Order.—Published reports of the past week in the daily press that Argentine Republic railways has awarded a large contract for cars to American builders refer to an order placed several months ago with the Harlin & Hollingsworth Corporation, Wilmington, Del., and the Wilmington plant of the American Car & Foundry Co. The former company will build a number of passenger cars, while the portion of the order going to the American Car & Foundry Co. consists of 1,200 to 1,300 freight cars of different types.

The Standard Coupler Co. has declared the regular semi-annual dividend of 4 per cent on preferred stock, and a dividend of 2 per cent on common stock, payable Dec. 24. The annual meeting will be held Jan. 11.

The American Car & Foundry Co. has declared the usual dividend of 1¾ per cent on its preferred stock, and one-half of 1 per cent on its common stock, payable Jan. 2.

The Washburn Wire Co. has declared the usual quarterly dividend of 1¼ per cent on its preferred stock, payable Jan. 3.

The A. Watson Construction Co., Dallas, Tex., has the general contract for the $150,000 Wilson building, Kansas City.

CONTRACT OBLIGATIONS

To Receive Attention of Institute Committee—Seal Adopted.

Several official acts of considerable importance have recently been taken by President Gary and the directors of the American Iron & Steel Institute. Prominent among these has been the creation of a committee on contract obligations, with Willis L. King, of the Jones & Laughlin Steel Co., as chairman, and with President E. A. S. Clarke, of the Lackawanna Steel Co., and Samuel Mather, of Pickands, Mather & Co., as the other members. W. B. Schiller, president of the National Tube Co., has been designated as chairman of the special committee on the question of the six-day week with continuous operation, of which the members recently named are J. A. Campbell, of the Youngstown Sheet & Tube Co., E. A. S. Clarke, of the Lackawanna Steel Co., George G. Crawford, of the Tennessee Coal, Iron & Railroad Co., and F. W. Wood, of the Maryland Steel Co.

J. A. Campbell, president of the Youngstown Sheet & Tube Co., has been made a director of the institute, vice W. J. Gilbert, who, as secretary, still acts with the full capacity of a director. Charles Kirchhoff has been named as the official representative of the institute on the committee on uniform nomenclature of iron and steel of the International Association for Testing Materials. Prof. Henry M. Howe is chairman of this committee.

The suggested design of an official seal of Theodore W. Robinson, vice president of the Illinois Steel Co., has been officially adopted for the institute by the directors. The suggestion of Mr. Robinson was recently illustrated in THE IRON TRADE REVIEW. The work is now proceeding of putting into book form, for distribution among the members, a complete account of the recent meeting and tour of the institute.

Will Banquet.—The Oregon district of the United Metal Trades Association of the Pacific Coast will give a banquet, Tuesday evening, Dec. 20, at the Commercial Club, Portland, Ore., to the members of the Pacific Northwest Foremen's Association. The coming dinner will be the third in a series, which have been held annually.

Dividend Reduced. — The Empire Iron & Steel Co. has declared a semi-annual dividend of 2 per cent on its preferred, a reduction of 1 per cent for the half year.

LESS DECREASE

Shown in Corporation's Monthly Tonnage—Percentage Smaller.

The smallest actual tonnage and percentage decrease in unfilled orders since the United States Steel Corporation has been issuing monthly statements of the condition of its books, is shown by the figures as of Nov. 30 which were announced Saturday, Dec. 10. These show a falling off of 111,536 tons from the previous monthly statement of business at the close of Oct. 31, or a reduction of 3.88 per cent. The inference to be derived from this announcement is that while new orders entered the past month have not shown any appreciable increase, the curtailment of active mill capacity has been effected to a point where the outgoing shipments are more nearly approaching the rate at which new business is being received. The corporation is now operating about 54 per cent of blast furnace capacity while the finishing mills are running at a little better rate.

The figures in themselves set a new low record for unfilled tonnage upon the books of the Corporation but they must be interpreted in the light of Judge Gary's recent statement that the present compilation eliminates the tonnage that has passed between different subsidiaries of the Corporation and accordingly does not show up as favorably when compared with the quarterly statements some of which included such business. The present manner of figuring tonnage however, has obtained since the plan of issuing monthly statements has been followed so that a comparison of these figures is a proper one.

Since the plan of making monthly announcements has been followed, the statements of business on hand, the tonnage and percentage of decline from the previous month have been as follows:

	Orders in tons.	Decline. Tonnage.	Decline. Percentage.
Nov. 30, 1910...	2,760,413	111,536	3.88
Oct. 31, 1910....	2,871,949	286,157	9.12
Sept. 30, 1910..	3,158,106	379,022	10.74
Aug. 31, 1910...	3,537,128	433,803	10,92
July 31, 1910...	3,970,931	286,863	6.72
June 30, 1910...	4,257,794	.....	.....

The following table gives a compaative statement of the Corporation's unfilled tonnage at the end of each quarter since early in its history, as shown by the quarterly reports:

June 30, 1910	4,257,794
Mar. 31, 1910	5,403,514
Dec. 31, 1909	4,796,031
Sept. 30, 1909	4,796,833
June 30, 1909	4,057,939
Mar. 31, 1909	3,542,595
Dec. 31, 1908	3,603,527
Sept. 30, 1908	3,421,977
June 30, 1908	3,313,876
Mar. 31, 1908	3,765,343
Dec. 31, 1908	4,624,552
Sept. 30, 1907	6,425,008
June 30, 1907	7,603,878
Mar. 31, 1907	8,043,858
Dec. 31, 1906	8,489,718
Sept. 30, 1906	7,936,884
June 30, 1906	6,809,859
Mar. 31, 1906	7,018,712
Dec. 31, 1905	7,605,086
Sept. 30, 1905	5,865,377
June 30, 1905	4,829,655
Mar. 31, 1905	5,579,560
Dec. 31, 1904	4,696,203
Sept. 30, 1904	3,027,436
June 30, 1904	3,192,277
Mar. 31, 1904	4,136,961
Dec. 31, 1903	3,215,123
Sept. 30, 1903	3,278,742
June 30, 1903	4,666,578

COPPER PRODUCERS' REPORT FOR NOVEMBER.

The report of the Copper Producers' Association for November, published today, shows these comparisons:

Production, 119,353,463 pounds, a decrease compared with October of 7,115,821 pounds; deliveries into consumption, domestic, 60,801,992 pounds, a decrease of 7,012,180 pounds; and exports, 67,424,316 pounds, a decrease of 762,596 pounds; leaving stocks on Dec. 1 at 130,389,069 pounds, a decrease of 8,872,845 pounds from stocks on Nov. 1.

WINNIPEG CONCERN PASSED TO NEW HANDS.

The Western Steel & Iron Co., Ltd., of Winnipeg, Can., has become the successor to the Western Iron Works, Ltd., of that city, with considerably increased resources. It proposes to manufacture ornamental and architectural iron work, forgings, castings, railroad and contractors' materials and specialties on an extended basis. The officers of the company are: President, C. M. Simpson; vice president, Alex Simmers; manager and secretary-treasurer, H. R. Eade.

Foundrymen Organize.—The Foundrymen's Association of Cincinnati has been organized by representatives of 16 of Cincinnati's leading foundries. It is planned to hold monthly meetings, when the foundry situation can be freely discussed. The following officers were elected: President, George Houston, of The Houston, Stanwood & Gamble Co.; vice president, William Goodman, of the Laidlaw-Dunn-Gordon Co.; secretary and treasurer, W. B. Dean, of The Dean Mfg. Co.

The Balke Iron Works, of Louisville, Ky., has filed amended articles of incorporation increasing its capital stock from $25,000 to $32,000. The limit of its indebtedness has been raised from $15,000 to $25,000. The company manufactures bar iron.

HANNA'S AIM

To Pubish High-Class Business Paper —New Marine Editor.

George V. Callahan, who, for the past 20 years has edited the marine department of the *Cleveland Plain Dealer*, has severed his connection with that paper to engage in similar work on the *Cleveland Leader*. As it is the evident intention of Dan R. Hanna, the new owner, to make the *Leader* an authority along business and industrial lines, the move is universally recognized to be a good one, because no man in lake circles is better acquainted with the trade than Mr. Callahan. The business of the lakes is closely interwoven with the great iron trade of the United States, and

GEORGE V. CALLAHAN.

Mr. Callahan's knowledge of lake conditions, which are ever shifting and which bear an intimate relationship with the general state of the iron industry, is certainly unsurpassed. His column in the *Plain Dealer* has been for the past 20 years a great reflection of the daily mood of the trade, and long association with it has endowed him with unusual powers of analysis and prophecy. Mr. Callahan's predictions are rarely in error and his knowledge of the trade is so profound that he cannot readily be led into making a false statement. He instinctively knows when news that comes over the wire or from any source whatever is incorrect and that is why his column has high value. The *Leader* is to be congratulated upon such an acquisition to its working force.

GOVERNMENT WORK

Proving Much More Expensive Than That of Private Yards.

The contract for the new battleship No. 35, for which the Newport News Ship Building Co was the only bidder, will not be awarded until congress has had an opportunity to pass upon all questions involved in the suddenly increased cost of naval construction.

A conference was held Dec. 10 by the secretary of the navy and General Manager Walter A. Post and Superintendent of Hull Construction H. L. Ferguson, of the Newport News Shipbuilding Co., at which the company tendered an offer to construct battleship No. 34, which existing law requires shall be built in a navy yard, for the same price bid on No. 35—$5,760,000. The old controversy involving the advisability of building battleships in navy yards will be revived by a communication sent recently to the house committee on naval affairs by the secretary of the navy. This letter states that the navy department cannot build No. 34 for less than $7,500,000, and that work cannot be commenced until the additional $1,500,000 is appropriated. The secretary also states that work on the battleship Florida, now building at the Brooklyn navy yard, cannot be completed unless congress will extend the limit of cost from $6,000,000 to $6,400,000, which will make that vessel cost $239.34 per ton displacement, as against $180.80 per ton for her sister ship, Utah, now being built under private contract.

The offer of the Newport News Ship Building Co. to build No. 34 for $1,740,000 less than the amount for which the government can do the work, in spite of the eight-hour restriction, has forced naval authorities to admit that battleship construction can be done more economically at private yards, and the secretary's letter to congress is in fact nothing more or less than an argument to that effect. In view of the figures in the case and the present universal tendency of the entire government toward economy, it is difficult to imagine that congress will take other action than to wipe out the navy yard-built restriction and invite bids from all ship builders. This supposition is emphasized by the fact that the matter has been brought up by the navy department, at whose instance the navy yard limitation was originally imposed.

Curiously enough, throughout this entire agitation, no move has been made to wrest from congress any modification or even an elucidation of its eight-hour restriction which caused all but one bidder to decline to go after a $6,000,000 contract.

MANY LOCOMOTIVES

Negotiated For by Harriman Lines—Other Business Pending.

Some important locomotive business is now actively under negotiation between the railroads and the builders. The principal railroad order of this kind pending is that of the Harriman Lines, which call for 153 locomotives of different types. The Boston & Maine railroad is also contemplating the purchase of 50 locomotives as a part of the rehabilitation plan announced for that line. The Pennsylvania Railroad Co. has some important locomotive business under construction. Orders of the week reported include two mogul freight locomotives for the Green Bay & Western Railway, one 10-wheel freight locomotive for the Atlanta & Westpoint Railroad, and one consolidated locomotive for the Gua Oui La Paz Railroad.

TO SELL WHARTON IRON.

Pilling & Crane, Real Estate Trust building, Philadelphia, have been appointed exclusive selling agents in all territories of the entire output of the Wharton Steel Co., Wharton, N. J., maker of basic, foundry and forge pig iron. The company operates four furnaces, three of which are at Wharton, N. J., and the other at Phillipsburg, N. J., with a capacity of over 1,000 tons of iron per day.

Foundrymen Meet.—The regular meeting of the Philadelphia Foundrymen's Association was held in the Manufacturers' Club, that city, on Dec. 7, last. Renominations of the old officers for the new year were made, but election will not be held before the January meeting. A paper, "Automatic Bar Tucker With Working Model and Demonstration," was read by James Whitehead, of the Abram Cox Stove Co. The Philadelphia association has received an invitation to be present at the annual banquet and entertainment to be given by the New England Foundrymen's Association, on Jan. 11.

Reports read at the annual meeting of stockholders of the Connellsville Machine & Car Co., Connellsville, Pa., on Dec. 5, show that the company has a fair volume of business on its books. Directors of the company will meet during the ensuing week to elect officers.

ADDITIONAL STACK

To be Built by Alan Wood Iron & Steel Co.—Other Extensions.

Orders have been given by the Alan Wood Iron & Steel Co., Philadelphia, for the work to proceed upon the erection of a third stack at the blast furnace plant of the Richard Heckscher & Sons Co., Swedeland, Pa., which is now a subsidiary of the company under a recent consolidation. The new stack will serve as an alternate one to the present two furnaces and will have a capacity of 350 to 400 tons daily. An engine house is being built and this, in time, will be equipped to provide a separate blowing unit for the new stack so that eventually there will be three separate furnaces at the plant. A new boiler house is also being built at present. At first, however, the new stack will be operated alternately with the two present stacks.

The Alan Wood Iron & Steel Co. is now constructing a hot metal bridge across the Schuylkill river, connecting its steel works and finishing mills at Ivy Rock, Pa., with the blast furnace plant. This will be completed and the first liquid metal delivered to the open-hearth furnaces about Feb. 1. Other plans are in view for the extension of the finishing capacity and the rounding out of the operations of the company, and will be carried out as business conditions justify. Julian Kennedy, Pittsburg, is the engineer in charge of the furnace improvements.

ST. LOUIS SHIPMENTS.

Receipts and shipments of pig lead and spelter at St. Louis for the last two weeks were as follows:

	Zinc and spelter.	Pigs of lead.
Receipts:—		
For week ending Dec. 3.....	98,350	35,481
For week ending Dec. 10.....	97,490	37,570
Shipments:—		
For week ending Dec. 3.....135,260		27,870
For week ending Dec. 10.....128,900		19,730

Denton & Flagg, who have offices in Cleveland, Chicago and Detroit, have been appointed direct sales representatives for the Cumberland Steel Co., of Cumberland, Md., for its line of turned, ground and polished shafting, in 12 states west of Pennsylvania. In addition to this, Denton & Flagg also represent the Ohio Seamless Tube Co., of Shelby, O., in the same territory.

The Sloss-Sheffield Steel & Iron Co. has declared the regular quarterly dividend of 1¾ per cent on its preferred stock, payable Dec. 21.

The Youngstown Sheet & Tube Co. has declared the regular quarterly dividend of 2 per cent.

CRUDE STEEL

Will be Quoted in New Way—Numerous Meetings of Manufacturers.

Considerable interest is centered in the announcement that in the future steel mills will quote billets and sheet bars f. o. b. Pittsburg or Youngstown. This decision was reached at a recent meeting of manufacturers in this city. It is not known whether the arrangement is to be permanent. Several weeks ago, some companies were quoting prices f. o. b. maker's mill, regardless of location. Late in November, an effort was made to have all mills quote f. o. b. Pittsburg, but this has since been modified and prices are now being quoted f. o. b. Pittsburg or Youngstown.

Offers of $13.00, valley, on 2,500 tons of basic for immediate shipment have been refused by practically all the furnace interests in this section.

Manufacturers of plates are meeting at Pittsburg, today, this being one of a series of meetings called this week by chairmen of the various branches of the American Iron and Steel Institute. Practically all manufacturers were represented at the meeting.

Leading mills continue to quote $1.40, Pittsburg, although $1.45, Pittsburg, has been done recently.

The sheet manufacturers met in Pittsburg, Dec. 8; the rail and structural manufacturers met in New York, Monday; the tin plate section met in this city yesterday, the plate people are meeting today and the bar section will meet in Pittsburg, tomorrow. The dates for the meetings of the manufacturers of pipe and wire products have not been announced.

Personal

T. C. Clarke, manager of sales of the sheet steel piling department of the Lackawanna Steel Co., has sailed for a European trip.

Frank S. Gorton, former treasurer of the Chicago Pneumatic Tool Co., is seriously ill with acute asthma at his apartments in Chicago.

Benjamin Thirlby, executive of the Traverse City Iron Works, Traverse City, Mich., since 1882, has retired being succeeded by W. F. Calkins.

President W. W. Jacobs, of the Shelby Iron Co., is making a visit of inspection of the company's properties in the locality of Birmingham, Ala.

A. W. Wheatley, of Montreal, has assumed charge of the Brooks plant of the American Locomotive Co., succeeding John R. Magarvey, appointed manager at Schenectady, N. Y.

J. M. Gardner, formerly special agent of the Gardner Machine Co., Beloit, Wis., with headquarters in Cleveland, has accepted a position with the W. M. Pattison Supply Co., Cleveland.

Announcement is made by Charles G. Armstrong, consulting engineer, New York City, that he has taken into partnership his son, Francis J. Armstrong, under the firm name of Charles G. Armstrong & Son.

A. W. Thompson, chief engineer of the Baltimore & Ohio railroad, has been appointed general manager of the company's lines. G. L. Potter, third vice president, has declined re-election.

George D. Evans, superintendent of the Sharon, Pa., mills of the American Sheet & Tin Plate Co., has resigned, effective Jan. 1, to become manager of the Carnahan Tin Plate & Sheet Co., at Canton, O.

H. H. Williams has resigned as superintendent of the Lake Shore Engine Works, Marquette, Mich., being succeeded by E. L. Pearce. The chairmanship of the board has been accepted by F. H. Begole.

George H. McDougall, lately connected with the Lake Superior Corporation, has been appointed mechanical superintendent of the Dominion Steel Corporation. Charles W. Mitchell has resigned his position as general superintendent of the Steel works.

W. W. Stephens, president of the Stephens-Adamson Mfg. Co., of Aurora, Ill., has returned from Europe, where he spent some time in the study of the shops and methods of the larger manufacturing establishments of England, France and Germany.

George C. Gordon, of Worcester, Mass., for four years superintendent of the Wyman & Gordon Co., manufacturer of automobile crank shaft and other high grade drop forgings, has joined the forces of the Park Drop Forge Co., of Cleveland, as works manager.

Paul Konig, who recently resigned as president of the New York metal exchange, has been named representative of the American Smelting & Refining Co., at Berlin, Germany, where the company will open an office Jan. 1. Joseph Clendenin will have general charge of the office.

Will Not Build.—A report has been circulated in this territory that the Colorado Fuel & Iron Co. expects to build an additional blast furnace. We are advised by J. F. Welborn, president of the Colorado Fuel & Iron Co., that this corporation does not intend to build any additional furnaces at this time.

Obituary

James E. Karns, aged 82, founder of the Karns Mfg. Co., at Springdale, Pa., died at his home in Springdale, Dec. 9.

William L. Casaday, plow manufacturer at South Bend, Ind., died unexpectedly of heart failure, Dec. 10, at his winter home near Los Angeles, Cal., aged 66. He was president of the South Bend Chilled Plow Co., which he organized 23 years ago. He invented a method of chilling plows, thus laying the foundation for his subsequent success, and in all he invented and patented over 200 articles.

Walter L. Pierce, general manager and director of the Lidgerwood Mfg. Co., New York, died unexpectedly from an attack of heart disease at his apartment in the St. Andrews hotel in that city, Dec. 9, aged 55. Beside his connection with the Lidgerwood Mfg. Co., Mr. Pierce was vice president, treasurer and manager of the Garton & Lidgerwood Co., and treasurer of the Hayward Co., New York. He was a member of the Engineers and other New York clubs.

H. B. Sturtevant, identified with the iron mining on the Mesabi range, died, Nov. 30, at Philadelphia, aged 54. For several years he was manager of the Pioneer mine, at Ely, and for some time superintendent of the Iroquois mine at Mountain Iron. He resigned his position at the Pioneer mine in 1902, and for the next three years was general superintendent of the Rogers, Brown & Co.'s properties on the Mesabi and Menominee ranges. In 1907 he turned his attention to salt making in southern Michigan. At one time, Mr. Sturtevant had charge of lead and zinc mines in the Joplin, Mo., district.

John Rogers Maxwell, for many years president of the Atlas Portland Cement Co., director of Manning, Maxwell & Moore, Inc., New York, and many other corporations, died at his home in Brooklyn, Dec. 12, from cerebral apoplexy. Mr. Maxwell was stricken suddenly. Up to an hour of his death, he was apparently in his usual health. His age was 64. Mr. Maxwell was prominent in railroad circles, having become president of the Central Railroad of New Jersey when that line was purchased by a syndicate, five years ago. He was serving as chairman of the executive committee at his death. He retired a few months ago as president of the Atlas Portland Cement Co.,

Calumet & Arizona Mining Co. has declared the regular quartely dividend of $1 a share, payable Dec. 19.

IRON AND STEEL SECURITIES

The New York stock market in the past week displayed, in the main, a rising tendency, the rally in the latter part being aided by a decision against the government in the suit against the anthracite railroads. Bonds are quiet, with little investment buying in expectation of January disbursements.

Monday's market was quiet, sales reaching only 630,000 shares. Price changes were almost insignificant; parliamentary elections depressed the English markets, consols declining 7/16. Stocks broke violently Tuesday at the closing hour, industrials showing the effect of the heaviest pressure; English consols declined to the lowest price since 1831. After declining on Wednesday to new low prices, the market rallied and closed firm and fractionally higher; the government crop report on wheat placed the conditions at 82.3 per cent, the lightest December average for years. About midday Thursday, stocks again broke violently but made complete recovery at the close; sterling exchange was weak and there was some talk of gold imports in the near future. A better tone was displayed Friday, and prices averaged higher at the close; prospects of gold imports caused discounts to rise in London; the government cotton report caused a sharp rise in the market. Saturday the market was moderately active and firm, and the average was higher than the previous close.

Call money showed a little more firmness, ranging from 3⅝ to 2⅛ per cent. A fair business was done in time money, being stimulated by the rise in call money rates. An actual increase of surplus reserve was reported by the banks, which now stands at $6,131,075. Actual figures of cleaning house banks reported; surplus increased $663,325; loans decreased $14,298,200; deposits decreased $18,116,900, and the ratio of reserve 25.5, a decrease of 0.4 per cent. Non-member banks and trust companies showed; loans increased $5,766,700; net deposits increased $5,551,100; and the percentage of reserve, 17.3, a decrease of 0.1. Bank clearings showed a decrease of about 1 per cent, compared with the previous week, and almost 3 per cent compared with last year. Commercial failures for the week were 287, compared with 275 the preceding week, and 254 the corresponding week last year.

Shares were sold to the number of 2,824,900, compared with 4,143,600 the preceding week, and 4,141,600 the corresponding week last year. Bonds, exclusive of government bonds were sold to the amount of $10,321,000, compared with $9,487,000 the preceding week, and $24,517,000 the corresponding week last year.

	Closing Quo. Dec. 10.	Changes in week	Annual Meeting Date 1910	Stock Outstanding	Basis	Dividend Last Dividend	Dividend Date Last Div. Pay.
Allis-Chalmers	8½	— ⅜		$19,820,000			
Allis-Chalmers, pr	27½	—2⅝		16,150,000	7 cum.	1¾ Q.	Feb., 1904
American Can	9	.....	Feb. 2	41,233,300		1¾ Q.	
American Can, pr	77⅜	+ ⅜		41,233,300	7 cum.	1¼ Q.	Jan., 1911
Am. Car & Fdy	50½	+1	June 24	30,000,000		½ Q.	Jan., 1911
Am. Car & Fdy., pr	115⅛	+1⅛		30,000,000	7 n. c.	1¾ Q.	Jan., 1911
American Loc	37	+1¼	Oct. 18	25,000,000	5	1¼ Q.	Aug., 1908
American Loc., pr	105	— ⅞		25,000,000	7 cum.	1¾ Q.	Oct., 1910
American Ship	77	— ⅜	Oct. 12	7,600,000	4	1 Q.	Sept., 1910
American Ship, pr	111⅛	.....		7,900,000	7 cum.	1¾ Q.	Oct., 1910
Am. Steel Foundries(new)	43	.....	Dec. 1	17,184,000		1¼ Q.	Nov., 1910
Barney & Smith	20	.....	June 7	2,000,000	4	1 Q.	Dec., 1910
Barney & Smith, pr	85	.....		2,500,000	8 cum.	2 Q.	June, 1908
Bethlehem Steel	29	.....	April 5	14,862,000		.....	.....
Bethlehem Steel, pr	59	.....		14,908,000	7 n. c.	¾ Q.	Feb., 1907
Cambria Steel	42¾	—7¾	Mar. 15	45,000,000	5	1½ Q.	Nov., 1910
Cambria Iron	45¼	.....		8,468,000*	4	2 S. A.	Oct., 1910
Chicago Pneumatic Tool	40¾	+ ¼	Feb. 21	6,485,800	4	1 Q.	Oct., 1910
Colorado Fuel	31½	+1	Oct. 17	34,235,500		1¾ Q.	Apr., 1902
Crucible Steel	12⅜	+ ⅜	Oct. 19	24,578,400		3½	.....
Crucible Steel, pr	77¼	+ ¾		24,436,500	7 cum.	1¾ Q.	Dec., 1910
Empire Steel	8	+1	Feb. 23	1,254,770		.....	.....
Empire Steel, pr	55	.....		2,500,000	6 cum.	3 S. A.	July, 1910
Fay & Egan	70	.....	Feb. 15	1,000,000	6	3 S. A.	Feb., 1909
Fay & Egan, pr	115	.....		1,000,000	7 cum.	1¾ Q.	Nov., 1910
General Electric	154	+3½	May 10	65,179,600	8	2 Q.	Jan., 1911
Harbison-Walker	32½	— ¼	Jan. 17	18,000,000		½ Q.	Dec., 1910
Harbison-Walker, pr	95	.....		9,600,000	6 cum.	1½	Oct., 1910
International Pump	41	— ¼	May 10	17,762,500		1 Q.	Nov., 1910
International Pump, pr	83½	—1		11,350,000	6 cum.	1½ Q.	Nov., 1910
Lackawanna Steel	40	.....	Mar. 9	34,978,000		.....	.....
Lake Sup. Corp	27	+ ¾	Oct. 5	40,000,000		.....	.....
New York Air Brake	70½	+1½	June 16	10,000,000	8	1½ Q.	Oct., 1910
Niles-Bement-Pond	98	.....	Feb. 2	8,500,000	6	1½ Q.	Dec., 1910
Niles-Bement-Pond, pr	104	.....		2,000,000	6 cum.	1½ Q.	Nov., 1910
Otis Elevator Co	49	—1	Mar. 21	6,375,000	3	1½ S. A.	Oct., 1910
Otis Elevator Co., pr	95	+1		6,310,000	6 n. c.	1½ Q.	Oct., 1910
Pa. Steel	60	.....	May 9	10,750,000		.....	.....
Pa. Steel, pr	103	.....		16,500,000	7 n. c.	3½ S. A.	Nov., 1910
Pittsburg Coal Co	18	+1¼	Mar. 8	28,104,600		.....	.....
Pittsburg Coal Co., pr	66½	—2⅜		27,071,800	7 cum.	1¼ Q.	Oct., 1910
Pressed Steel Car	30	— ⅜	Feb. 16	12,500,000		1 Q.	Aug., 1904
Pressed Steel Car, pr	94	.....		12,500,000	7 n. c.	1¾ Q.	Nov., 1910
Pullman	159⅞	—2¼	Nov. 9	120,000,000	8	2 Q.	Nov., 1910
Railway Stl. Spring	31	+ ¼	Mar. 3	13,500,000	2	1 S. A.	Oct., 1908
Railway Stl. Spring, pr	92¾	—3¾		13,500,000	7 cum.	1¾ Q.	Dec., 1910
Rep. Iron & Steel	31	.....	Oct. 19	27,191,000		.....	.....
Rep. Iron & Steel, pr	93	—1½		25,000,000	7 cum.	1¾ Q.	Jan., 1911
Sloss-Sheffield	50	+ ¾	Mar. 9	10,000,000	5	1¼ Q.	Sept., 1910
Sloss-Sheffield, pr	114½	.....		6,700,000	7 n. c.	1¾ Q.	Oct., 1910
U. S. Pipe & Fdy. Co	15½	— ½	June 22	12,106,300	2	1 Q.	Dec., 1910
U. S. Pipe & Fdy. Co., pr	54	—1½		12,106,300	7 n. c.	1¼ Q.	Dec., 1910
U. S. Steel	73⅝	.....	April 18	508,302,500	5	1¼ Q.	Dec., 1910
U. S. Steel, pr	116	+ ⅞		360,281,100	7 cum.	1¾ Q.	Nov., 1910
U. S. Steel 5s	103⅝	+ ⅛		463,798,000	5	.....	.....
Va. Iron, Coal & Coke	50	.....	Sept. 20	9,073,680		5. †	Oct., 1907
Westinghouse Electric	67⅞	+1⅞	July 27	3,998,700*		10½Q.**	Oct., 1910
Westinghouse Air Brake	139	.....	Oct. 4	13,750,000*		5 Q. ‡	Oct., 1910

Par value of shares, $100, except those starred (*), $50.
**Includes 8¾ per cent on back dividends.
†Stock.
‡Includes 1½ extra and 1 special.

Copper Stocks.

New York.—Amalgamated Copper closed 64⅝, a net gain of ¼.

Boston.—Butte Coalition closed 17¾, unchanged; Calumet & Arizona closed 49, a net loss of 2; Calumet & Hecla closed 535, a net loss of 65; North Butte Mining closed 29¾, a net gain of ¾; Quincy Mining closed 74, a net loss of ½.

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THE AVERAGE PAID CIRCULATION OF THE IRON TRADE REVIEW FOR THE ISSUES OF THE FOLLOWING MONTHS WAS:

January, 1910	5,681
February	5,703
March	5,754
April	5,793
May	5,827
June	5,842
July	5,864
August	5,875
September	5,895
October	5,955
November	5,993

December 15, 1910

SCALE CONTRACTS

In the old days, the wages in most of the iron mills in the central west were on a sliding scale basis, the fluctuations being produced by changes in the "iron card." The card rate was the uniform asking price of the manufacturers, rather the average realized after sales had been made through individual negotiations. Later the Carnegie interests paid wages on a sliding basis, the controlling element being the published market price of Bessemer steel billets. This scale was settled with difficulty in 1889, for a period of three years, and it was a failure to renew it, which precipitated the famous Homestead strike of 1892, one of the points at issue being the refusal of the men to permit the base limit to be lowered at least to the market price, so as to restore the sliding feature. There were, of course, many other points of difference.

It may be on account of there being very little collective wage bargaining in the iron and steel trade of the present day that there is so little wage payment on the sliding scale basis, the only case of importance being that of the iron mill scales of the Amalgamated Association and the United Sons of Vulcan. These are sliding scales, the control being the average realized price on base sizes of common iron bars at selected mills, during bi-monthly periods.

In the sale of materials in the iron and steel industry, scale contracts have been on the increase for years. Connellsville coke in particular has been sold more and more on the scale basis, relative to pig iron prices. This method of selling in the coke industry appears to have grown out of a practice of actually exchanging the commodities, for years ago it was not uncommon for the seller of the coke actually to take the pig iron, selling it himself at the best price he could obtain. In other cases, the definite tonnage of pig iron passed to the control of the coke operator, who, however, constituted the furnace his sales agent for the particular iron. This particular practice has largely fallen into disuse, and the more convenient practice has grown up of basing the settling price for the coke upon the published price of pig iron, although in some cases the basis is the realized price of the furnace taking the coke. The making of a contract involves the settling of what grade of iron shall be taken, and what shall be the ratio, in terms of tons of coke per ton of pig iron. Usually these contracts contain a minimum, below which the price of coke cannot go, however low the price of pig iron. Sometimes, too, the ratio changes as prices change. It is perfectly safe to estimate that during the first half of next year more coke will be delivered based upon scale contracts than based upon sales at flat prices.

A favorite form of selling pig iron is that of basing the settling price upon the current price of pig iron, ascertained by one means or another. It is curious, viewed from the present-day standpoint, that basic pig iron has actually been sold on the basis of Bessemer pig iron prices, the buyer being allowed a fixed differential below Bessemer. As basic iron has become by far the more active commodity, there is no tendency to use this complicated principle at present, and scale contracts for basic iron are naturally based upon the developed price of basic iron.

Some years ago a batch of contracts for Bessemer iron was made, the settling basis being two-thirds the price of Bessemer steel billets. This was somewhat curious, in view of the fact that billet contracts have been very frequently based upon the price of Bessemer iron, so that the two varieties of contracts were apparently working at cross purposes. Contracts for billets are still based upon pig iron, while sheet bar contracts are sometimes based upon the open market price of sheet bars.

In the dross trade, scale contracts are very common, and are regarded as practically a necessity. Zinc dross, for instance, is sold on the basis of a stated percentage, usually between 75 and 80 per cent, of the market price of virgin spelter at the time of shipment. Tin dross is sold in the same manner, and such are the fluctuations in the market, upon which the recovered material must of course be sold, that sales involving delivery only a few days ahead are customarily made on the percentage basis rather than upon a flat price.

In all these transactions, there is the tendency to get away from bar-

ter and enter upon contracts simply that the details may be settled, the buyer and seller merely picking each other out as those with whom they will do business.

In an active and well-sustained market little difficulty develops through the operation of a scale agreement to buy and sell materials for the prevailing and general price is fairly easily ascertained. But when the market is weak and uncertain, it oftentimes becomes a matter of extreme difficulty to learn definitely any one price upon which the scale may be based. In other words, a scale works satisfactorily when the definite base price is widely known; it works indifferently and often leads to disagreement between the contracting parties when sellers are merely trying to get the best prices they can, the general market price being indefinite because of maximum and minimum quotations on the same grades of the same materials. Hence, scale contracts are not invariably satisfactory because of inherent bases for likely fundamental disagreement, the very thing they are supposed to obviate.

That the principle of the scale contract appeals very strongly to both buyer and seller is indicated by the fact that it is adopted so often when there is the obvious objection that it is not altogether easy to find a basis entirely satisfactory to both parties. A scale contract necessarily depends upon developments, and there must be a medium to furnish those developments. Frequently the average price of Bessemer or basic pig iron, as compiled from actual market sales, is taken, while frequently also trade paper quotations are taken. It is impossible to avoid occasional controversies when each month furnishes a new price upon which a given tonnage is settled under each contract. It speaks well, both for the pains taken by the representatives of the trade press and for the candor of the members of the trade, in giving them information that an issue is so rarely made as to the valididty of published quotations.

THE MECHANICAL ENGINEERS' MEETING

Last week the American Society of Mechanical Engineers held its thirty-first annual meeting in New York. It is easy, while one's perspective is still blurred by the nearness of the event, to say that it was the most successful ever held by the organization. We do believe, however, that if the recent meeting will not, upon critical review, be considered the most successful ever held by the society, it will at least be included among the most distinctive. The objects of the society are twofold—educational and social—and to be truly successful, a meeting must be so arranged that both the educational and social features receive their just allotment of time and attention, without either encroaching upon the other. The reading and discussion of professional papers is the most important feature of any technical gathering. As has been heretofore noted in THE IRON TRADE REVIEW, complaint has been made by many members that entertainments and social functions were usurping time which should be devoted to serious work. No such charge can be brought against the recent convention.

Contrary to the custom of previous years, the excursion features were confined to one day, Friday being devoted wholly to that purpose. By this arrangement, full working time was available on the other two days for the reading and discussion of papers and no one was obliged to miss any of the professional sessions in order to enjoy the excursions and entertainments. This innovation apparently met the hearty approval of the members and is to be commended.

The policy of presenting only a few papers at each session, allowing ample time for discussion, which was inaugurated a year ago, was followed at the recent meeting. After a thorough trial this procedure has proven eminently satisfactory, and it will undoubtedly become a part of the fixed policy of the society.

The three papers in grinding are worthy of special consideration. The possibilities of the modern grinding machine, equipped with up-to-date fast-cutting wheels, do not seem to be thoroughly and generally appreciated by shop managers. As was clearly brought out in the papers and discussion, for a great variety of work the grinder is not only an extremely accurate tool, but an economical one as well. A study of the papers on grinding would undoubtedly suggest to the live manager many possibilities for improvements and economies.

The society invited a distinguished foreign educator, Dr. Georg Kerschensteiner, director of the Industrial Continuation Schools of Munich, to give an address on Thursday evening. This address, which will be published in abstract later in THE IRON TRADE REVIEW, contains suggestions that might prove of value to Americans. The philosophy of vocational training advanced by Dr. Kerschensteiner, which takes account of the future man as a factor in civic life, is a new message to many on this side of the Atlantic, but of this we shall have more to say later.

THE COKE PROBLEM

The Connellsville *Courier*, a recognized authority on coke, publishes the greater part of an editorial published in THE IRON TRADE REVIEW of Nov. 3, under the above caption, and comments as follows:

These statements are substantially correct and deductions drawn from them are logical; in fact, they have become actual conditions with many of the coke operators. The last coke boom did do more harm than good, and most all the coke booms have been harmful at one or another stage of their careers. There is nothing which will effectively regulate coke prices to stability and reasonable profit but some sort of a combination, either in a central selling agency such as is now under formation, or an actual merger of the coke properties into one company.

The "ultimate effect," which our contemporary mentions, namely, that of encouraging the by-product system, will be cheerfully assumed by the Connellsville coke operators. With a coal which produces the finest furnace fuel in the world, the Connellsville region does not fear competition from any kind of ovens since it may if necessary adapt itself to them.

MEETING OF AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Large Attendance and Reading of Able Papers Were Features--- Col. E. D. Meier Succeeds George Westinghouse in the Presidency

A large attendance, coupled with professional papers of exceptional variety and merit, marked the thirty-first annual meeting of the American Society of Mechanical Engineers, which was held in the Engineering Societies building, New York, Dec. 6 to 9. The attendance totaled 895, including members and guests. Two days were devoted entirely to professional sessions during which time 15 papers were presented and discussed. Contrary to custom, the excursion features of the meeting were confined to one day, Friday being devoted wholly to that purpose. The able manner in which the program was arranged, permitted maximum attention to be given to the reading and discussion of papers without detracting from the enjoyment of the entertainments and excursions.

Election of Officers.

The meeting was called to order for the first session on Tuesday evening at 8:30 p. m. The election of officers and the president's address have been already noted in THE IRON TRADE REVIEW.

Wednesday Morning Session.

The business meeting of the society was held at the opening of the Wednesday morning session. Secretary Rice announced the election of 125 new members, 15 associate members, 126 junior members and 28 promotions to member's grade. W. R. Warner read the report of the committee on raising funds to meet the society's share in the purchase of the land occupied by the Engineering Societies building. There remains less than $90,000 to be subscribed.

Interesting reports of the joint meeting in England last summer were given by F. R. Hutton, honorary secretary, and C. W. Rice, secretary. Mr. Hutton outlined the beneficial results which have accrued from this joint meeting, and also expressed the American Society's hearty appreciation of the unusual courtesies extended to the visitors. Secretary Rice's report went into the details of the meeting in England, which have already been reported in THE IRON TRADE REVIEW.

At the suggestion of President Meier, who read a telegram announcing the death of Wm. H. Bryan, St. Louis, a member of the committee on meetings, a resolution of sympathy with the bereaved family was passed.

James M. Dodge, chairman of the committee on public relations, presented a report discussing the work the committee has outlined, and stating that the important subject before the committee is the consideration of the proposals to license engineers advanced by several states.

Transmission of Heat in Surface Condensation.

The first professional paper, "The Transmission of Heat in Surface Condensation," by Geo. A. Orrok, New York, was then presented.

The paper contains the results of 771 heat transmission tests made by the author on 16 kinds of condenser tubes under various conditions of condenser practice. It also includes 84 tests made by Allen in England, 47 tests by Hepburn in the United States, 53 tests by Hagemann in England, 40 tests by J. P. Joule, 41 tests by Stott and Pigott, 40 tests by Weighton, 35 tests by Josse, and 34 tests by Clement and Garland.

The object in making these tests was to determine the heat transfer through various kinds of condenser tubes and the laws governing its variation under different conditions of steam temperature, pressure and velocity; velocity of circulating water; and mean temperature difference.

In order to obtain these data, a small surface condenser was constructed with a relatively small cooling surface and it was operated under conditions as nearly like actual condenser conditions as possible. The author arrived at the following conclusions: (a) The heat transferred from condensing steam surrounding a metallic tube of cold water flowing through the tube is proportional to the seven-eighths power of the mean temperature difference of the water and steam temperatures. This is equivalent to the statement that the coefficient of heat transfer, U, is inversely proportional to the eighth root of the mean temperature difference. (b) The coefficient of heat transmission, U, is approximately proportional to the square root of the velocity of the cooling water.

(c) The coefficient U is independent of the vacuum and of the velocity of the steam among the tubes or in the condenser passages. It may be proportional to the square root of the velocity normal to the tubes, but in all common cases this velocity does not vary more than a tenth part.

(d) The effect of air on the heat transferred is very marked indeed, particularly at high vacua, and most of this air is due to leakage through the walls and joints of the apparatus. Working from Smith's curves and certain picked tests, where the volume of air could be calculated, the effect of the presence of air in reducing the value of U is as follows:

$$U = c\left(\frac{P_s}{P_t}\right)^5$$

Opening the discussion of this paper, Prof. Wm. D. Ennis, Brooklyn, asked the author how the rate of flow in the experimental condenser compared with standard condensing practice. Mr. Orrok replied that the experiments were within the limits of condenser practice. Prof. Ennis stated that he could not see why the air in the steam should vary so much with a closed cycle and a constant vacuum and have such an effect on the water velocity curves. Prof. Kent stated that he was puzzled about the expression "mean temperature difference" in the paper and pointed out that it was not necessarily correct to take the arithmetical mean since the temperature of the condensing water varies along a curve, and is not a linear function. He stated that the paper would be more complete if it included a formula by which the square feet of heating surface in a condenser required to condense 1,000 pounds of steam under given conditions of vacuum and temperature could be computed. In concluding his discussion, Prof. Kent stated that he liked the method pursued by the author, and that he should be complimented for the careful manner in which his studies had been carried on. Another speaker pointed out that the air which collects on the outside of condenser tubes, forming an insulating coat, is very harmful in its effects and recommended that the tubes be provided with a device to scrape off the air film similar to the scraping device used on the tubes of boiler economizers. A written discussion by Thos. C. McBride said in part:

The conditions of the first tests were apparently, however, those which we meet in low pressure turbine practice, and it seems therefore to the writer that they should have a practical value. It is hoped that the author will explain more fully the origin of the exhaust steam used in the apparatus as first constructed, and his conclusions as to what might have been expected from it as revealed by his

tests, if used on low pressure turbine work.

In all tests of the kind conducted by the author, the amount of air and non-condensible vapors present in the steam must necessarily introduce an element of doubt as to the results, and the presence of this element of doubt in the author's mind is shown in his statement. The author does not state how he arrived at the conclusion that there was not more than ¼-inch air pressure in the condenser, nor has he commented on any comparison of this statement with Mr. Smith's conclusions; the latter stating that if air is present to the extent of 1-20 inch of mercury the ratio of effective volume of the air pump to boiler feed pump is 20 to 1.

If, as the author states, the partial air pressure in his apparatus approached ¼ inch of mercury, the results obtained can hardly be considered as applying to practical conditions in surface condensers. In the writer's opinion, the heat transfer results obtained indicate very much less air, this opinion being based on the heat transfer results obtained and air condition existing in surface condenser plants. Any condenser having as much as ¼ inch air pressure would require a vacuum pump of a size that would be prohibitive.

It is interesting to note that the author proposes to undertake some measurements of dry air pump discharge and sincerely to be hoped that he will be good enough to present these results to the society. The writer does not know of any data having been published concerning this feature of condenser work, although Mr. Morrison seems to have made a study of the subject as set forth in the paper which the author has quoted.

These questions suggest the advisability of the society adopting some sort of a standard method of testing large condensers, particularly as refers to the question of the amount of air present and the influence of this air on the results obtained.

In closing the discussion, the author stated that the tubes used in the experimental condenser were all of the same thickness, No. 16 gage. He again pointed out the difficulties due to the presence of air in the condenser, which he believed was unavoidable under the conditions, since the exhaust steam was obtained from a long main to which open heaters were attached. He said that, although there are undoubtedly variations in temperature inside the shells of large condensers, they could find no variation in temperature larger than 1/10 of a degree in the experimental condenser.

Wednesday Afternoon Session.

The Wednesday afternoon session opened with a paper on "Combustion and Boiler Efficiency," by Edward A. Uehling, Passaic, N. J.

The paper stated that: It is now fully recognized by all progressive and observing engineers and managers of power houses that there is more room for economy in the boiler house than in any other part of the plant. It is therefore not due so much to lack of recognition of the fact that there is still from 5 per cent to 25 per cent of the available energy of the coal needlessly wasted that this waste continues to an appalling degree, as to the inherent difficulty in regulating combustion so that the loss may be reduced to a minimum.

The efficiency of the steam generator depends on conditions far more complex than does that of the steam engine or dynamo. The latter, when properly designed and constructed and adjusted for the work, will operate at maximum economy. The attendant can do very little or nothing to decrease or increase their efficiency, whereas in the operation of a steam boiler no such adjustment is possible. All depends on the proper attendance; adjustments cannot be made to serve once for all time. So many modifying factors enter in, such as atmospheric conditions, quality of fuel, both chemical and physical, rate of driving, etc., that fixed adjustment is impossible.

The heat energy carried off by flue gas in general boiler room practice is rarely as low as 15 per cent and not infrequently reaches 40 per cent of the calorific value of the fuel consumed. This loss is made up of two distinct factors; first, the sensible heat of the flue gas, and second the potential heat of the combustible constituents it contains. The former varies directly as the stack temperature and inversely as the per cent of CO_2; the latter is independent of the stack temperature but for any given per cent of combustible constituents in the flue gas the loss also varies inversely as the per cent of CO_2. It is therefore evident that the per cent of CO_2 in the flue gas and the stack temperature are the controling factors in steam boiler economy. In the paper the writer has endeavored to show the importance of knowing these two factors.

Since the excess of oxygen is necessary for complete combustion, it is held by some combustion experts that O is a better index to the efficiency of combustion and boiler economy than CO_2.

A study of the classified tables of analyses given in Appendix No. 1, and more especially a study of the diagrams plotted from these analyses, may lead to the conclusion that the percentage of O might answer as well as the percentage of CO_2, but hardly better. When we consider that CO_2 is very much more readily determined than O, and that there are a number of practicable instruments on the market that will autographically record the percentage of CO_2 in the flue gas at short intervals, one of which will make a continuous record and at the same time indicate the percentage of CO_2 at the boiler front, there can be little room for doubt as to which of the constituents is the better adapted to serve as the index of economical combustion.

The highest practicable furnace efficiency obtains when the greatest possible part of the potential energy contained in the coal is converted into sensible heat by combustion. The highest boiler efficiency results when a minimum of this heat is carried off by the flue gas. The former is realized when combustion is complete, the latter when the weight and temperature of the flue gas are a minimum. Since the weight of flue gas decreases as the percentage of CO_2 increases, high boiler efficiency requires high CO_2.

On the other hand, when the furnace is run so as to produce a maximum percentage of CO_2 there is danger of reducing its efficiency because of incomplete combustion due to a minimum of free oxygen. It would seem, therefore, that the highest combined efficiency of boiler and furnace would be obtained when the gain due to reduced weight of flue gas, i. e., due to an increased percentage of CO_2, is balanced by the loss due to incomplete combustion.

Conclusions.

We must conclude from these calculations that the percentage of CO_2 and the stack temperature are the two controling factors in the production of furnace and boiler efficiency. In view of the fact that both of these components are so easily determined and that apparatus is in existence which will continuously indicate and record them, it is lamentable that more general use is not made of these indices.

There is today no valid reason why scientific methods should not prevail in securing fuel, as well as in consuming it, especially for power purposes, nor is there any reason why consumers of large quantities of coal should be ignorant of its ultimate, as well as its proximate composition.

It is not generally feasible, nor is it at all necessary, in order to obtain the most economical results, that calculations be based on the ultimate analysis of the coal, but a full analysis of the flue gas should form part of the daily routine. Inasmuch, however, as the most economical percentage of CO_2 varies considerably with the kind of fuel used, and also to some extent on the method of firing, hand or mechanical, the kind of stoker and rate of driving, it becomes very desirable, if not absolutely necessary, to make a series of tests in which all the essential elements are determined.

Having established the most economical value of CO_2, this component of the flue gas will serve as a correct guide to the fireman. An automatic record, preferably a continuous one, for the engineer is of the greatest value. If, in addition, the stack temperature is indicated for the fireman and recorded for the engineer in charge there should be little difficulty in getting maximum efficiency."

The discussion seemed to indicate that the operation of continuous CO_2 recorders has not been entirely satisfactory and that there are several other methods of maintaining boiler efficiency than the measurement of CO_2 in the flue gas. Prof. R. C. Ennis stated that after all air leakages above the grates of a certain boiler in Brooklyn had been chinked up the CO_2 increased from 4 to 11 per cent, equivalent to an increase in efficiency

from 57 to 85 per cent. He stated that stratification in the furnace results in the simultaneous presence of O and CO in the flues, and that therefore CO_2 is a more reliable index of boiler efficiency than oxygen alone. Referring to the operation of continuous CO_2 recorders, he stated that in many machines the gas takes from 6 to 15 minutes to reach the apparatus, so that when the fire is in the best condition the recorder indicates the worst conditions. Prof. Kent said that he was sorry the paper did not tell the advantages of furnace temperature in keeping up boiler efficiency and that a temperature of 3,000 degrees generally indicated good economy, while a temperature of 1,500 to 2,000 degrees showed low efficiency. Prof. Jacobus stated that in struggling to get from 12 to 14 per cent CO_2 in the chimney gas often more than 1 per cent CO was produced, due to keeping down the oxygen, and therefore a large quantity of CO_2 did not necessarily mean efficient operation unless it could be shown that the CO was at least less than 1 per cent. J. C. Parker attacked the paper, saying that he did not believe high CO_2 necessarily meant economical operation and that he had found continuous recorders out of order most of the time. He said the recorders were more of a laboratory instrument than a boiler room device. Mr. Billings said it was remarkable how soon even an ignorant fireman learns to beat the recorders and advanced the opinion that draft measurement is a much more practical means of checking economy. He said:

What we want is a mechanical device which will show how the fireman handles his fire. O. H. Bathgate presented a written discussion stating:

Little exception can be taken to any of the author's statements, though I find that several very important factors necessary for conclusions have been either omitted or not given their proper value. Referring to paragraph 3, second condition, a proximate analysis of coal is insufficient for the purpose intended. A separate determination of sulphur is necessary to associate the quality of coal with efficient steam generation.

I agree with the author that for daily boiler room practice when the maximum CO_2 is likely to be below 12 or 13 per cent, the omission of the remaining gas constituents is not serious, and for the average fireman the simplifying of such matters tends to greater efficiency.

I believe that a plant where the CO_2 is determined either manually or automatically, should also provide a means for determining the carbon in the ash. Gas and ash analysis are equally essential to a complete knowledge of combustion, for in actual experience, I have found firemen sacrificing coal to the advantage of a high CO_2 record. This indicates that gas analysis in itself, is not necessarily a true index of boiler efficiency.

The author states that correct gas analyses, indicating furnace and boiler efficiency, depend on the composition of fuel, stack temperature and temperature at which analyses are made, and yet none of these appear to have been considered. Inconsistent results would therefore be expected, these varying with the conditions under which the analyses were made. Fewer results, corrected to a basis of standard fuel, temperature, etc., would have derived more reliable conclusions. It would be interesting to know the ratio of available hydrogen to carbon in fuel and the conditions of firing from which the results of tables 7 and 8 were made. The variable conditions affecting the total of oxygen components have probably more to do with the inconsistent results than inaccurate analyzing.

B. Viola, Brooklyn, read a paper on "Automatic Control of Condensing Water," which described a device for automatically regulating the cooling water admitted to condensers in vacuum plants. His paper was severely criticized, one member stating that it gave absolutely no data showing the advantages of automatic control and that the condenser illustrated was antiquated and out of date. Mr. Shellcross said that while Mr. Viola's proposition is a good one, a number of slight mechanical changes in the device would greatly improve its efficiency.

Papers giving the results of tests of a 10,000 kilowatt mixed flow turbine and a 9,000 kilowatt Curtis turbine at San Francisco were read by Samuel L. Naphtaly and F. H. Varney. The papers are abstracted as follows:

Test of a 10,000 K. W. Steam Turbine.

This paper gives the results of steam economy tests made on a 10,000-kilowatt turbo-generator unit, at the plant of the City Electric Co., San Francisco, Cal., under operating loads. Methods of conducting the tests, apparatus used, and application of correction factors to meet specified conditions are described. Results on basis of water rate, Rankine cycle efficiencies and thermal efficiencies as given. Several diagrams illustrate the results of tests and conditions during tests.

A general description is given of the turbine and generator construction, covering the features of the double-flow type of turbine, and a new principle in oil relay operation of the main valves. An interesting feature is the high speed of rotation, 1,800 revolutions per minute.

Test of a 9,000-K. W. Turbo-Generator Set.

The above turbine has a rating of 9,000 kilovolt amperes, or (with a power factor of 80 per cent) capacity of 7,200 kilowatts. The guaranteed efficiency was at full load, 9,000 kilowatts (unity power factor), with steam at 175 pounds gage pressure, superheat at 125 degrees Fahr., and a vacuum of not more than 2 inches absolute back pressure; the turbine was to generate a kilowatt at 16.4 pounds of steam. The machine was tested on the regular commercial load which it was endeavored to keep as nearly constant as possible. The duration of the test was approximately four hours with an approximate load of 7,000 kilowatts, immediately followed by another four-hour run with an approximate load of 9,000 kilowatts. The final result of the test for the 7,000-kilowatt load was 16.06 pounds of steam per kilowatt-hour without correction, and 15.82 pounds of steam with all corrections made; for the 9,000-kilowatt load, 15.95 pounds of steam without correction, and 15.42 pounds with all corrections made. This showed the turbine to be approximately 3½ per cent better than the guarantee on 7,000-kilowatt load, and approximately 6 per cent above the guarantee on the 9,000-kilowatt load.

In a written discussion, E. D. Dreyfus said in part:

The author is to be commended for having selected working conditions under which he obtains the highest ultimate economy and for having endorsed rotative speeds which obviously conduce to higher efficiencies.

Fig. 1 demonstrates that 100 degrees Fahr. is about the upper limit of superheating that may be profitably employed. In constructing this diagram, care has been taken to favor high superheat as much as possible, so that I believe it presents the most optimistic view of the subject. While the water rates which Mr. Naphtaly obtained with his turbine, 14.57 pounds as tested, and 13.88 pounds corrected, somewhat exceed other recorded consumptions, there has, nevertheless, been established a new mark in the efficiency of conversion of the available thermal energy between the throttle and exhaust pressures into electrical energy at the switchboard: viz., 69 per cent as referred to the Rankins cycle.

In concluding my remarks the floor space occupied might be mentioned. By employing the higher speed of 1,800 revolutions per minute instead of 900, the unit has been reduced in length about 17 per cent. Mr. Naphtaly developed his plans providing for two rows of turbines in the engine room, faced alternately with respect to one another. The 10,000-kilowatt turbines of the type described, demand floor space of only 0.18 square feet per kilowatt of normal capacity installed.

Discussion by J. H. Lawrence.

J. H. Lawrence:—Mr. Naphtaly gives a table which is a summary of the tests made on the 10,000-kilowatt unit. One column is headed "B. t. u. per k. w. hour." His results vary considerably from those which I have calculated, and give the turbine a much lower consumption than I think it should be credited with. I have tried various methods and have used both the old and the new steam tables, but have not been able to check the figures given in the table.

I. E. Moultrop:—Mr. Naphtaly has contributed some very valuable data upon the Westinghouse double flow turbine, about which very little information has been published. The unit is large, having a normal rating of 10,000 kilowatts and an overload capacity of 50 per cent. As the rise of temperature on the generator is only 60 degrees Cent. after 24 hours of 1½ load, this unit might be given a rating of 15,000 kilowatt maximum. It

seems from the test that this unit is very efficient, especially at the low superheat and vacuum used.

The vacuum correction curve shows a very small saving from an increase of vacuum, thereby differing widely from an impulse turbine. The shape of the vacuum correction curve would indicate that the effect of increased vacuum at overloads would be very light indeed.

W. H. Emmett, Schenectady, N. Y., commented on the small discharge area at the low pressure end of the 10,000-kilowatt turbine made necessary by the high stresses in the drum to which the low pressure vanes are attached, due to the high rotating speed. On account of this congestion at the discharge end, the steam left the last stage at a speed of 1,600 feet per second and therefore carried 16 per cent of its total energy into the exhaust. Concluding the discussion, Mr. Walker said that, although low speed turbines are much more easily built, since they require less careful shop work, nevertheless the field for the high pressure turbine is a high one.

A paper entitled "Notes on the Value of Napier's Coefficient with Superheated Steam," by Isaac Harter Jr., Bayonne, N. J., concluded the Wednesday afternoon session.

The paper comprises a report of a series of determinations of the value of Napier's coefficient for steam at pressures closely averaging 160 pounds per square inch absolute, and for various degrees of superheat ranging approximately between 50 and 200 degrees. The values as given show:

(a) Numerical increase in the value of coefficient corresponding with increased superheat.

(b) The increase in the volume flowing at constant pressure as the superheat increases.

(c) A decrease in the weight of steam flowing at constant pressure as the superheat increases.

A New Feature of Belt Driving.

The Thursday morning session opened with a paper on "A New Theory of Belt Driving," by Selby Haar, Schenectady, N. Y. The object of this paper is to present a theory of the process by which a belt transmits power and a study of the losses occurring in the belt while under load, so that its efficiency may be determined.

Some of the noteworthy features of the new theory are: The maximum allowable tension increases with the speed; the coefficient of friction increases with the speed and reaches values far above those usually assumed; the maximum efficiency of transmission is not limited by the speed; as the speed increases, the centrifugal tension replaces the initial tension so that the bearing pressure decreases; the speed of the belt is constantly changing, a regular cycle being repeated continuously when the load is steady; a new treatment of belt creep is given. Several opinions of this theory are presented, together with descriptions of apparatus and methods of testing used by the various experimenters.

A method of calculating the efficiency of a belt is developed and an illustrative example worked out. Data from several tests are included for comparison with the calculations.

The paper concludes with the following remarkable prophecy: "Eleven thousand feet per minute is no limit for belt speeds at present." Belt pulleys have run at 98,000 feet per minute. Brown, Boveri & Co. have reached 74,000 feet per minute; the Schuckert Co. run flywheels at 19,600 feet per minute, and so do American manufacturers. Air resistance is an important feature at such speeds. When air is excluded the resistance decreases to one-half, and in a vacuum is almost nothing. * * * We are by no means close to the limit of belt speeds, and the capacity of the belt does not commence to increase until high speeds are reached. Steam turbine speeds are so high that some reducing device must be provided and for this purpose the belt is the simplest and most practical connecting link. With transmissions at such high speeds the construction must be painstaking and the crowning of the pulley is an important feature.

The discussion brought out the statement that in American practice belt speeds even as high as 6,000 feet per minute are considered impractical and while high belt speeds may be theoretically efficient and high speed belts may work beautifully at first, it has been found that in every-day service they require heavy repairs. Carl Barth said that the paper did not present a new theory, but only a statement of alleged facts. He criticised the form of the curve published in this paper, showing the reduction of belt tension by centrifugal force, stating that the lag of the belt was not taken into account. At high speeds the tension required merely to balance the centrifugal force is too great to permit practical use of such velocities. He said that a tension of even 190 pounds per square inch cannot be maintained very long, without continually tightening the belt. Mr. VanDerhoe recommended a medium between the high speeds proposed by German engineers and the low speeds advised by some American engineers as the best all-around practice. He recommended the use of large idlers to increase the arc of contact and the coefficient of friction in order to reduce the slack side tension, increasing the effective pull, with no increase in tension on the tight side. Harrington Emerson, New York, said that there is a large loss of power due to stretch and high tension in high speed belts. He would not dare run belts in ordinary shop practice at the speed proposed in this paper. The only legitimate wear of a belt occurs on account of slipping on the pulleys and this wear is at a maximum when the belt is either extremely loose or extremely tight; what is necessary for efficiency and long wear is to run belts at a speed and tension producing minimum slip.

Ruinous Speeds Proposed.

F. W. Taylor criticised the paper for its lack of definite conclusions. He said the suggestions regarding high speed in the final paragraph are extraordinary and dangerous. A speed of 11,000 feet per minute in actual practice is far too high and even 6,000 feet per minute is ruinous. Belts run at this speed may be all right at first, but they soon begin to slip and stretch and make life a nightmare for the shop superintendent. The object in designing belt drives is not necessarily to attain the highest efficiency, but to avoid interruptions to manufacture. These interruptions, due to breakage and slippage of belts, are far more expensive than the small losses incurred in running belts at a lower efficiency. Prof. Wm. Kent pointed out that pulleys will not stand excessive speeds and wished the author had given the diameter and construction of the pulleys carrying the high speed belts which he mentions.

Stresses in Connecting Rods.

Winslow H. Herschel, New York, presented the paper entitled "A Graphical Method for Calculating Stresses in a Connecting Rod."

To avoid the assumptions generally made in calculating the stresses in a connecting rod by analytical formulae, Mr. Herschel proposes a graphical method for finding the stress at any point in a rod of any shape. Determination of the inertia forces of material points is simplified by means of a diagram calculated from exact formulae. The bending moment due to inertia forces is calculated by the usual string polygon method, and there is also a moment equal to the axial method, and a moment equal to the axial thrust multiplied by the sum of the deflection and an assumed eccentricity of loading. Deflections are found by Mohr's method and the eccentricity is assumed in accordance with the conclusions of Moncrieff.

The numerical examples show that in a simple shaft of uniform stress the maximum bending moment and maximum diameter will be less than 0.6 the length of the rod from the crosshead end, and the maximum bending moment at any one point will occur at about 38 per cent stroke. The stresses are much greater than given by the usual formulae, mainly on account of considering the bending moment due to axial thrust.

The consensus of opinion brought out by the discussion was that the method described in the paper was too laborious and not sufficiently simple

for daily use in the drafting room. In closing the discussion the author said:

If there are analytical methods of designing a rod which are simple, I would like to learn of them. I did not discover them when I wrote the paper. I do not think that the fact that the method is complicated has any bearing on the question of whether the center of a rod or a point 0.6 of its length from one end is the proper place for the largest section, as stated by Prof. Lanza. But the graphical method does not seem to show this as far as I can judge from results and it would undoubtedly depend on the amount of taper to the rod, which is usually a matter of judgment rather than calculation. So, some method seems to be required, which will indicate the correct amount of taper to use, instead of being obliged to rely wholly on judgment in the matter.

Reginald P. Bolton, New York, read a paper on "Operating Conditions of Passenger Elevators," and M. B. Kaven, Beverly, Mass., and J. B. Hadaway presented a paper on "Modern Shoe Manufacture."

Thursday Afternoon Session.

The session of most importance to engineers connected with the iron, steel and machinery business took place on Thursday afternoon. Simultaneous sessions were held. The general section, with President Meier in the chair, discussed the subject of grinding in modern machine shop practice, while the gas power section took up the exhaustive paper by E. P. Coleman on "The First Large Gas-Engine Installation in an American Steel Works."

The papers on grinding presented at the general section were as follows: "The Field for Grinding," by C. H. Norton, Worcester, Mass.; "Precision Grinding," by W. A. Viall, Providence, R. I., and "Modern Grinding Methods," by B. M. W. Hanson, Hartford, Conn. These three papers were considered together.

"The Field for Grinding," by C. H. Norton, is printed in full elsewhere in this issue.

Precision Grinding.

This paper is abstracted as follows:

Grinding is an art rather than an exact mechanical operation. It is an art of such recent growth that relatively little is known about it or its possibilities.

In speaking of grinding as an art I mean that it contains elements in which the judgment and experience of the operator count for a great deal. While in a general way the manufacturer or the skilled operator is able to give instructions for the running of the machines, yet conditions arise, which make it necessary to vary from these instructions in order to obtain the best results. To instruct an operator to use a given wheel and speed would make it possible for him to obtain any one of the three results. When ground with a wheel surface that is not true a piece looks as though it had been gouged upon a grindstone, while with a wheel surface that is true it gives a dull finish and shows the wheel marks. The latter is what we consider commercial grinding. When this same wheel has been run so that the points of the abrasive become somewhat dull, we obtain a highly-finished surface. All these results are possible with the same wheel under different conditions.

In considering a piece of work to be done, first of all the question arises as to the size and the limits suitable for the purpose for which it is intended.

The second necessity is that sizes should be established to which the work should be rough turned ready for the grinding room. In our works, as in all factories, the aim is to produce the desired results as cheaply as possible. Our desired ends have been accuracy and nicety of finish, where the parts ground are for fits, and nicety of finish where no fit is required. It will be noted that we allow from 0.008 to 0.012 inch in diameter, an amount easily obtained by the ordinary class of lathe help.

Modern Grinding Methods.

This paper is abstracted as follows:

The grinding machine as now used is of comparatively recent origin, within the memory of men now living. The first grinding machines suggestive of modern methods of grinding were made in England and America, but it is in America that they have reached their highest development.

The designers of grinding machinery have had many problems to solve. Different materials require different speeds and on the modern grinding machine there must be various speeds for the grinding member as well as for the traverse of the work; and for the revolution of the work in the case of the cylindrical grinder. Machines must be designed with water pumps, and the working parts must be protected from water as well as from the grit which comes from the grinding wheel. The grinding member usually moves at a high rate of speed and must have carefully designed bearings which will run freely, yet not allow any back lash, as true surfaces can only be obtained when the work and the reducing member move against each other in fixed positions. Most of these difficulties have been met and further refinements are constantly being made.

Surface Grinders.

Surface grinders have usually been made with the wheel grinding on its periphery and in some instances it may be necessary to continue to do work on this principle, as grooves and irregular shapes sometimes have to be ground and the thinness of the wheel makes it possible to get into narrow places; but when flat surfaces are wanted, the cup-shaped wheel has taken a foremost place in grinding. The wheel covers the whole width of the work at once and water is forced through the center of the spindle, centrifugal force throwing the water outward and compelling it to pass between the work and the wheel. It is astonishing with what rapidity work can be reduced to a flat surface under this process.

For such work as grinding guide bars, slide valves and link motions for locomotives, large stamping dies such as are used in electric works, facing automobile cylinders and automobile engine frames, I believe it will show its superiority over any other method by several hundred per cent. In one of the trials a surface of cast iron, 6 feet long and 20 inches wide was reduced in thickness 0.01 inch in five minutes, leaving an excellent finish and an exact flatness. In fact when tested no point in the surface showed out of true more than 0.0005 inch. In grinding steel this type of surface grinder produces chips that look very much like metallic wool, which seems to indicate that when a cupped wheel passes over the work the chips are made by the outer edge of the wheel in the same manner as chips produced by the outer edge of an end milling cutter. If the chips were made underneath the broad contact surface of the wheel there would not be room for them to curl up in the small places which are left between each cutting particle of the grinding wheel. The large surface in contact with the work simply smooths the surface.

To give an idea of the capacity of a grinding machine having a cupped wheel for grinding flat surfaces, compared with a grinding machine having a wheel grinding on its periphery and working on the principle of a planer, it is worth while to note the following:

The traversing speed of the work or the work table can be assumed to be the same. If a piece is 6 inches long and 3 inches wide, the machine grinding on its periphery will take about 48 strokes to cover the surface, assuming 1-16-inch feed for each stroke. The cupped-wheel machine will do the same amount of work with one stroke or in about 1-24 the time. These proportions are essentially true on hardened steel or on any kind of work where a nice finish is required.

The author also mentioned a new Pratt & Whitney surface grinder, which has reduced the thickness of pieces 22 inches long and 9½ inches wide, ⅛-inch in 4½ minutes.

Grinding Machine Manufacturers Criticized.

Opening the discussion W. L. Bryant pointed out the saving in assembling ground parts due to their accuracy as well as the labor-saving due to grinding.

A. L. DeLeeuw, Cincinnati, criticized the manufacturers of grinding machines for not publishing more information on the best methods of operation. He said that specific facts are necessary, giving the size and kind of wheels, speeds, feeds, depths of cut, etc., best suited to various kinds of work. He said there is an almost com-

plete lack of definite and accurate information along these lines, due largely to the newness of the art. There is no uniformity in grading wheels, the qualities of the binders vary and it is exceedingly difficult to get information on how to select the best wheel for a given job. He also criticized the lack of speed changes on grinding machines, which makes it difficult to maintain a uniform peripheral speed of wheel when the diameters vary from 7 to 15 inches.

H. A. Richmond said that few people aside from the wheel manufacturers know how to properly select grinding wheels for given conditions of work. This is a reason why grinding is generally considered an art rather than a science. He then gave the three principal considerations which govern the selection of wheels: 1. The abrasive material in the wheel; 2. The hardness of the wheel, that is, the tenacity with which the grains of abrasive are held together by the bond. Particular care must be observed in selecting cup wheels of the proper hardness; 3. The coarseness of the wheels.

Mr. Jepson, of the Norton Grinding Co., said that a modern grinder is a highly developed cutting tool and not a grinding device in the old conception of that work, and that the wheels used today are not operated at their maximum cutting capacity, due to the ineffective design of the machine. A machine of the planer type can be constructed to produce more work with less power consumption than any machine designed to cut with the periphery of the wheel.

Hess Defends Manufacturers.

Henry Hess asserted that the statements made by Mr. DeLeeuw were incorrect and asserted that the modern grinder can handle a larger variety of work and materials with less changes of cutting tools and with greater accuracy than any other type of machine tool. He stated that a day laborer with a minimum of experience could produce work on a grinding machine accurate to 0.0002 inch. He believed that the manufacturers of grinding machines have been unusually liberal in furnishing the public with information.

Closing the discussion for the authors, C. H. Norton said that the object of these papers was not to tell how to grind but to arouse interest in the subject of grinding. He also charged that engineers have not been as anxious to learn about modern grinding methods as they should be and that they have forced the manufacturers, who do not claim to know all about grinding, to take all the initiative. He remarked that coarse wheels do not necessarily cut coarse surfaces and that the speed of the wheel is not consequential within certain limits. A speed of 500 feet per minute more or less has little effect on the work. The lack of sufficient scientific knowledge on the subject of grinding is shown by the fact that in many shops doing a large amount of this work, the matter of wheel speeds, feeds, etc., is left almost entirely to the judgment of the individual workmen and different men using different methods often seem to achieve equally good results. The speaker pointed out that the grinding machine not only does work with extreme accuracy, but does it much cheaper than it could be done on a lathe, planer or milling machine.

Gas Power Section.

The discussion of E. P. Coleman's paper on the gas engine installation at the Lackawanna Steel Co. was the chief feature of the meeting of the gas power section Thursday afternoon.

The paper is abstracted as follows:

The installation described was conceived during a formative period in the design of gas power apparatus, and therefore does not represent contemporary practice. The operation is successful when considered from the viewpoints of continuity and reliability or service, and the economy of heat consumption is considerably in excess of that usual with compound steam engines.

The gas-cleaning and distributing apparatus may be unfavorably criticized in various ways. The distribution of water in the cooling towers is defective, and the flows are countercurrent only in alternate towers. The gas washing fans are less efficient as cleaners, and require a greater amount of power than approved rotary scrubbers of more recent design. The hot gas mains of the three pairs of furnaces are not interconnected, and the cleaned gases from the several washeries do not meet in a common mixing main.

The normal blast pressure may be taken as 16-pound gage. The blowing engine, having but one blowing cylinder, could not conveniently be equipped with unloading devices, and the powering of the engine is therefore necessarily excessive, the unit being required to operate against a maximum pressure of 30 pounds. The work required to drive the air and gas pumps amounts to 20 per cent or more of the indicated power, entailing a net mechanical efficiency which is unsatisfactory.

The efficiency trials were made upon a blowing engine already arranged for piping. This engine was equipped with motor pistons having but three instead of five packing rings. The 1,000-horsepower unit upon which the other trials were made was equipped with five rings at each end of the piston. The compression of the 1,000-horsepower engine was greater than that of the blowing engine and the various efficiencies indicated are somewhat higher in the case of the smaller engine. An increase of compression to 180 pounds or more would possibly produce some increase of efficiency. The lowering of the efficiency is principally due to pump work amounting to 20 per cent of the motor power or more; and incomplete combustion, amounting to 30 per cent or more, or the total heat supplied.

In connection with the efficiency trials upon the engines the gas was measured by Venturi meter. The coefficient of the meter was assumed to be unity, and no corrections were made for dirt and moisture undoubtedly present. The heating value of the gas was calculated from volume analysis obtained with Orsat apparatus, the high value being used. In the analysis of the exhaust gases, Orsat results were corrected by means of a correction chart plotted from the data of Dennis & Edgar, Jour. Am. Chem. Soc., vol. 19, p. 867, 1897.

Discussion of Paper.

Geo. D. Conly explained some of the peculiar characteristics of the indicator cards taken from these engines.

Jos. D. Morgan, of the Cambria Steel Co., said that in many cases gas engine installations can be carried too far in steel plants. No plant situated in a cheap coal region can use gas engines economically, in spite of the fact that there are a few which seem to fulfill this qualification. The power factor of working plants is seldom over 50 per cent when the idle days are considered. The cost of a gas engine plant is about $96.00 per horse power, which is much higher than the equivalent steam installation. Fixed charges will be the determining factor in the installation of gas engines in the future. He characterized the gas engine in steel plants as a new machine with an uncertain life.

Mr. Dunning spoke of the dust problem, showing that 50 milligrams of dust per cubic centimeter are prohibitive and that 20 milligrams are bad. He pointed out improvements made in gas engine design since the Lackawanna engines were built.

Mr. Bole suggested certain changes in the design, which probably would result in better service.

Geo. A. Orrok explained the conditions under which the engines at the Lackawanna plant operated, exposed to ore and steel dust. "It is a wonder," he said, "that the engines ran at all rather than that they operated poorly."

Nisbet Latta, Milwaukee, presented a paper entitled "Notes on a Heavy-Duty Gas Producer." This paper describes a producer using pulverized fuel, the device having originally been designed by L. H. Hirt. The speakers who discussed this paper did not have a very good opinion of the effi-

ciency of this type of producer nor of its practicability. It was pointed out that the coal used was high in British thermal units, while the gas produced had a low calorific value. It was also stated that the temperature within the producer was too high for any ordinary refractory material to withstand and that the efficiency was low on account of the large amount of unburned fuel.

Prof. R. H. Fernald was chosen chairman of the gas power section of the society, for the ensuing year.

Illustrated Lecture.

The formal meetings of the society were concluded on Thursday evening with an illustrated address on the "Industrial Continuation Schools of Munich," by Dr. George Kerschensteiner. Dr. Kerschensteiner outlined the methods pursued at these schools in Munich, in educating boys who wish to learn trades.

Friday was devoted entirely to excursions to points of interest in the vicinity of New York, including the New York public library, which has not yet been formally opened; the plant of Nelson Goodyear, Inc., Brooklyn, where an interesting exhibit of oxy-acetylene welding was witnessed; the Pond Machine Tool Co., Plainfield, N. J., where luncheon was served and several recently developed reversing motor planers were seen in operation; the Hudson and Manhattan power house; the shops of the Thompson-Lovelace Aeroplane Co.; the Robins dry dock at Erie basin; the New York telephone exchange and the New York navy yard.

Ball at Hotel Astor.

The chief social function of the meeting was the annual reunion ball, which was held as usual at the Hotel Astor, on Wednesday evening, and which was an enjoyable and brilliant affair. On Thursday afternoon from four to six o'clock the members of the society with their guests were entertained at tea by Mr. and Mrs. George Westinghouse, at the Hotel St. Regis.

Election of Officers.

For the committee on election of officers, George A. Orrak announced that Col. E. D. Meier, of New York City, president and chief engineer of the Heine Safety Boiler Co., St. Louis, and consulting engineer of the American Diesel Engine Co., St. Louis, had been elected president of the society for the ensuing year. The other officers elected are, H. H. Vaughan, assistant to the vice president, Canadian Pacific Railway, Montreal; E. M. Herr, vice president of the Westinghouse Electric & Mfg. Co., Pittsburg and George M. Brill, of Brill & Gardner, consulting engineers, Chicago, vice presidents; A. B. Katte, New York, Stanley G. Flagg Jr., Philadelphia, and D. D. Crawford, managers; and William H. Wiley, treasurer.

QUARTERLY MEETING OF CINCINNATI BRANCH.

The quarterly meeting of the Cincinnati branch of the National Metal Trades Association was held at the Business Men's club, Dec. 8. About 100 of the machine tool and other manufacturing interests were represented. R. K. LeBlond, president of the branch, acted as toastmaster at the dinner that immediately followed the business session. In the absence of Mr. Taylor, who was detained on account of illness, A. H. Lazarre, of The Iron Age, spoke on "Industrial Peace." Murray Shipley, of the Lodge & Shipley Machine Tool Co., took for his topic the proposition of the railroad companies to advance freight rates. Other speakers were Secretary Joseph Manley, Fred Geier, J. C. Hobart and W. S. Copely, of the Lima Locomotive Works.

SOIL PIPE FOUNDRY CONTRACT IS LET.

The Schuylkill Haven Foundry Co., Schuylkill Haven, Pa., which recently organized to manufacture soil pipe, has let contracts for the erection of buildings to J. H. Fertig, of Pottstown. The main structure will be 80 x 100 feet, and there will be several smaller buildings, all to be of brick and equipped with modern machinery. The plant will be located along the P. & R. railroad. The company was recently chartered with a capital stock of $30,000. These officers and directors have been chosen: President, Frank Brown; secretary, D. D. Coldren; treasurer, E. H. Baker; directors, E. H. Baker, George Mickel, J. F. Fleming, M. A. Blackton, George Opie, G. M. Paxson, Frank Brown, George Berger, Daniel Phillips, George Saul and D. D. Coldren.

Tashenberg Bros., proprietors of the Buffalo Boiler Works, Buffalo, have increased their business by buying the plant of the Frontier Boiler Works, on Illinois street. The Frontier equipment will be moved to Erie, Pa., where a small plant will be started.

NEARING SOLUTION

Is the Problem of Subway Construction in the Metropolis.

The uncertainties which have surrounded the proposed New York subway extensions since the opening of bids several weeks ago, under forms of both public and private construction, seem nearer to some solution in the near future. Both the Interborough Rapid Transit Co. and the McAdoo interests have submitted propositions to the public service commission, whereby they will undertake the construction and operation of the proposed work. The offer of the Interborough is to furnish $75,000,000, which, with $53,000,000 now available from the public funds, will be sufficient to construct the essential part of the enlarged system in Manhattan, the Bronx and Brooklyn. This proposition is based on regulated monopoly control of the present means of rapid transit in Greater New York, but it is stipulated that the fare on no part of the system will exceed 5 cents. President Theodore Shonts, of the Interborough, states that his company is prepared to begin work in 30 days after his offer has been accepted by the city.

In connection with the improvements to the rapid transit facilities of the metropolis, it is announced that the Interborough company has obtained consent of the public service commission to add third tracks to the Second, Third and Ninth elevated roads. The cost of these improvements is estimated at about $32,000,000.

LARGE GATE VALVES FOR NIAGARA.

The Chapman Valve Co., Springfield, Mass., has completed the construction of three of the largest gate valves ever made in this country, or in the world, so far as known, for the Ontario Power Co., Niagara Falls. The valves are of mammoth proportions, and are 31 feet high, with the waterway or opening 9 feet in diameter. The weight of each complete valve is 130,000 pounds, and of the largest single casting, 30,000 pounds.

The gate, or disc, is of cast steel in one piece and has a weight of 18,000 pounds. Each valve is operated by an electric motor and is placed at the head of a 9-foot steel penstock leading to a turbine wheel direct connected to a 12,000-kilowatt Westinghouse generator and working under a head of 160 feet.

OUR FOREIGN COMMERCE

Year's Tonnage Iron and Steel Exports Exceeds Previous Records by More Than Ten Per Cent---A Fresh Movement in Billets and Sheet Bars---Tin Plate Imports Decrease Sharply---Ore Imports in Detail

A forecast of the present year's iron and steel imports and exports can be made from the data now available, the October returns having just been made public. The exports of tonnage lines will break all previous records by more than 10 per cent, while the tonnage imports will exceed those of the past two years, but will fall short of those of 1906 and 1907. The following table shows our imports and exports of the tonnage lines for the past nine years, the 1910 figures being estimated from the returns for the first ten months. The items included are scrap, pig iron, rolled material, and, in the case of exports, wire, nails, pipe, etc. Iron ore is not included.

IRON AND STEEL—GROSS TONS.

	Imports.	Exports.
1902	1,206,811	372,398
1903	1,178,996	326,590
1904	266,398	1,167,710
1905	416,000	1,010,255
1906	577,809	1,325,740
1907	662,349	1,301,979
1908	205,845	964,242
1909	363,984	1,243,462
1910	475,000	1,490,000

October Exports Large.

The October exports of tonnage lines showed a large gain over the previous month, over 10,000 tons, or over 8 per cent, September having been among the poorest months of the year, while October was about 5 per cent above the average of the preceding nine months.

Exports of unfinished steel, the category including ingots, blooms, billets and sheet bars, showed a very sharp increase in October, due probably to increased exports of sheet bars, as for some time past there have been reports of aggressiveness on the part of the American sellers, particularly in South Wales. In the first six months of this year, such exports amounted to only 7,531 tons, or an average of 1,255 tons a month. Since then the exports have been as follows:

July	126
August	2,025
September	4,480
October	15,493

The exports of billets, sheet bars, etc., in October were still not large compared with some of the movements in the past. In 1904, for instance, the exports of this line amounted to 314,324 tons, or more than 26,000 tons per month.

There has been no important variation in the exports of iron and steel products outside the tonnage lines, and which are reported only by values. The value of all iron and steel exports in October was $17,452,085, the total for ten months being $164,376,387, and the excess of October over the average probably represents little more than the excess of the tonnage lines over the average, leaving the non-tonnage lines practically unchanged.

Imports Decreased.

Our imports of tonnage lines, including scrap, pig iron, billets, tin plates, etc., in the first six months of this year amounted to 274,584 tons, or at the rate of 45,764 tons per month. Since then imports have been as follows:

July	42,527
August	36,879
September	30,960
October	31,455

It will be observed that the past two months show a drop of fully one-third, as compared with the average of the first half of the year.

Tin plate imports have shown a particularly rapid drop. In the first eight months of this year, they amounted to 51,082 tons, or at the rate of 6,385 tons per month. September imports were only 2,719 tons, October showing a further drop to 1,669 tons.

Iron Ore Imports Heavy.

October showed heavy iron ore imports, a gain over September, this month, however, being considerably below the average of the year. The following table shows our iron ore import movement in full:

IRON ORE IMPORTS, CALENDAR YEARS GROSS TONS.

1903	980,440
1904	487,613
1905	845,651
1906	1,060,390
1907	1,229,168
1908	776,898
1909	1,696,411

	1909.	1910.
January	105,233	284,823
February	61,749	170,427
March	108,676	163,633
April	74,782	206,135
May	97,393	240,833
June	124,714	193,415
July	172,316	248,810
August	209,855	282,949
September	164,613	208,892
October	179,505	219,571
November	174,976	.....
December	222,609	.....
Totals	1,696,411	2,219,488

The sources from which ore imports have been drawn are shown below:

	October.	Ten months.
Spain	6,250	401,612
Sweden	36,177	209,017
Canada	19,729	140,040
Cuba	137,250	1,251,960
Other countries	20,165	216,859
Totals	219,571	2,219,488

The Canadian Westinghouse Co., Ltd., Hamilton, has declared its regular quarterly dividend of 1½ per cent and also a bonus of 1 per cent payable Jan. 10.

EXPORTS OF TONNAGE LINES—GROSS TONS.

	1907.	1908.	1909.	1910.
January	102,630	74,353	70,089	118,652
February	87,912	81,773	84,860	110,224
March	112,787	96,681	94,522	124,980
April	132,790	93,285	100,904	117,921
May	91,543	64,041	109,977	135,306
June	92,996	69,770	114,724	120,601
July	122,240	86,796	100,680	128,060
August	118,792	86,244	105,694	131,060
September	114,819	76,732	97,392	118,737
October	123,170	85,766	110,821	129,325
November	116,309	71,130	115,943	.....
December	86,019	77,659	137,688	.....
Totals	1,301,979	964,242	1,243,467	1,231,307

VALUE OF IRON AND STEEL EXPORTS—TONNAGE AND NON-TONNAGE.

	1907.	1908.	1909.	1910.
January	$ 14,327,926	$ 13,468,058	$ 10,329,383	$ 14,513,394
February	13,946,842	14,063,559	10,947,159	13,949,082
March	16,419,116	15,168,155	13,874,461	17,258,503
April	17,684,863	15,455,319	13,058,054	16,529,254
May	14,594,043	11,281,415	12,993,197	17,658,042
June	17,226,259	11,677,944	13,779,736	16,503,204
July	17,614,017	12,085,951	11,866,772	16,108,102
August	17,587,181	12,058,561	14,136,219	17,628,538
September	16,830,160	11,221,799	12,966,908	16,776,178
October	18,786,750	11,505,063	14,249,598	17,452,085
November	17,051,755	10,895,549	14,434,690	.....
December	14,997,869	12,231,741	15,075,183	.....
Totals	$197,066,781	$151,113,114	$157,680,331	$164,376,387

SMALL PROFITS

Made by Many Lake Carriers in Year Just Closed.

Notwithstanding the fact that more freight was moved on the great lakes during 1910 than ever before and at a higher rate than prevailed in 1909, the season was one of small profits for many lake vessels. To begin with, operating charges were higher. The wage scale was $15 per day higher on large steamers, fuel coal was considerably advanced, hull insurance charges were increased 1 per cent, while on the other hand the stages of water were so low throughout the entire season that vessels could not load within 6 inches of their normal draught, meaning that they carried from 300 to 400 tons less per trip. The operating conditions were a complete reversal of those which obtained during 1909. During that year, vessel owners were in general agreement not to send their ships out until June or later, with the result that the fall movement was extremely lively, the shippers doing all the tramping to get tonnage and the vessel owners sitting unconcerned in their offices. This year the season opened with a rush and the April, May and June movements were record breakers for each respective month, the June movement being in addition the record breaker for any month in the history of the business. By that time, however, furnaces were beginning to slow up on orders and were even showing a disposition to cancel. It was clear that the movement had been overdone and the shippers were having difficulty in keeping their own vessels busy. Independent interests agreed to retire 20 per cent of their tonnage for 30 days, which was as well, as the ships were practically idle anyhow. One by one, the vessels went into ordinary to remain there throughout the remainder of the year, for the trade offered no opportunity to put them in commission again. In fact, from July on the slump continued unbroken. Up to July 1, the ore movement had gained 6,215,933 tons over that of 1909, but the lead was reduced to less than 1,000,000 tons by the time the season ended. The slump was especially severe during September, October and November, in fact, by the middle of September Lake Erie ports were filled with vessels that had already sought their moorings for the winter. Independent interests carried a less proportion of ore than they have ever carried before and the indications are that this proportion will decrease hereafter. The new ships that are under order in lake ship yards are practically all for steel-making interests.

ELECTRIC FURNACE CONTRACT IS CLOSED.

Contracts have been closed for the first installation of the Roechling-Rodenhauser electric induction furnace in this country, which will be made at the plant of the Crucible Steel Casting Co., Lansdowne, Pa. The furnace will be of two tons capacity and, because of its small size, will be operated single phase, 25 cycles, instead of three phase. The electricity will be supplied from a General Electric generator, driven by a Le La Vergne oil engine of 425 horsepower capacity. At first, cold melting will be followed, but later a cupola will be installed to melt down the steel scrap before refining. The furnace will be furnished by the American Electric Furnace Co., 45 Wall street, New York City, which controls the patent rights of the Roechling-Rodenhauser as well as the Grondal-Kjellin process. Other negotiations for the installation of electric furnaces in different works in this country are now under way, but owing to general business uncertainties, some of these will probably not develop to definite action for some time.

CASE HARDENED PARTS.

The R. D. Nuttall Co. has introduced an innovation into railway equipment parts by bringing out case hardened gears and pinions. The Nuttall company has had a good many of these in service for some time, but deferred announcing the new line until experience had shown that the case hardened gears would perform well under severe conditions.

Meeting in Boston.—The American Society of Mechanical Engineers had scheduled, for December, two meetings besides the annual meeting in New York. One was held by the society in St. Louis, on Dec. 10; the other will be held by the society in Boston, on Dec. 16. At the latter meeting, the Boston Society of Civil Engineers and the Boston section of the Institute of Electrical Engineers will co-operate. Samuel B. Fowler, consulting engineer, Boston, will present a paper, on "Terminal Facilities for Handling Freight."

The Metropolitan Water & Sewerage board, Boston, will erect a hydro-electric plant at Clinton, Mass.

GOOD PRICES

Obtained on Small Lot of Canadian Ore Recently Sold.

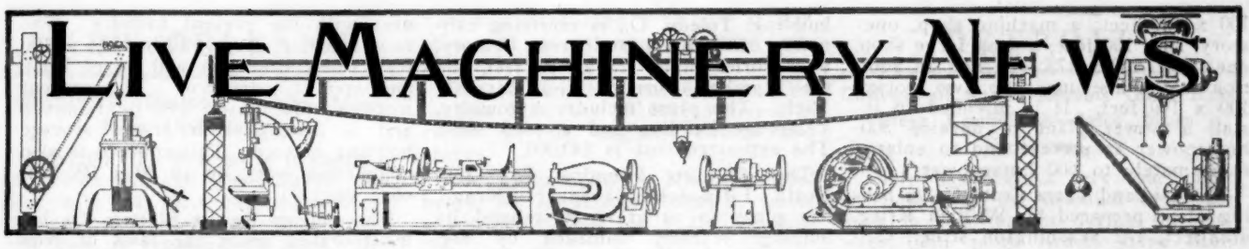
It is reported that the comparatively small block of Canadian iron ore recently contracted for by an eastern blast furnace for next year's delivery, was bought at close to 8 cents, delivered, per unit of iron at consumer's plant. From the standpoint of ore sellers, this is looked upon as a favorable price considering the grade of the ore disposed of and it tends to add weight to the expectation that foreign ores will probably sell at higher prices next season at eastern seaboard than the present year. Already it is understood German and English iron makers have contracted for large quantities of Swedish ore for next year's delivery, which on the same mine basis would make a pretty high price delivered at eastern seaboard.

Universally in the east there is a belief that the contracting in eastern domestic and foreign ores will not begin until late spring under present conditions of trade. It is certain that with curtailed operation the average eastern pig iron maker has more ore on his hands at this time than he had bargained for. Some contracts for domestic lump ore have been taken out freely and are quite well filled, but considerable furnace ore will be carried over until next year. Domestic shipments in November were not as heavy as in October, and this has been due largely to the activity of some consumers in the latter month taking in more ore than their actual needs in order to protect themselves against handling difficulties in winter.

NEW SHOP COMPLETED.

The Stephens-Adamson Mfg. Co., of Aurora, Ill., has just completed a new steel fabricating shop for the manufacture of conveying and screening machinery. The building is of steel construction designed by the J. C. Buckbee Co., of Chicago. This company has also increased the size of its offices and power plant. These additions have been greatly needed to take care of a largely increasing business.

Free List for Ore.—Congressman Henry, of Texas, has introduced a bill providing that the following-named articles shall be placed upon the free list: Coal, coal slack, cotton ties, bitumen and iron ore.



CLEVELAND

Business Fair.—Large Railroad List Expected Out in Few Weeks.

The general consensus of opinion among machinery dealers and manufacturers is that another dull period, such as was experienced during the late summer and early fall months, will not depress the market again, at least for six months. Sales have been comparatively good the past few weeks and are still improving. The greatest promise, however, is shown by the inquiries which have been submitted to the trade. These are increasing rapidly in volume and are expected to lead to the placing of considerable business. Dealers at present are awaiting impatiently the appearance of a considerable list which the Lake Shore & Michigan Southern Railway Co. will issue, for machine tools and other equipment for its Elkhart, Ind., shops. This list is expected to appear in about two weeks. It is not thought, however, that the railroad company will make any awards on it until some time next spring. Second-hand machinery is dull at present and the supply is greater than the demand. A number of manufacturers are taking prices on machinery for new plants which they are either building or are expecting to build. A number of these opportunities are given below.

Plans are being prepared by the Osborn Engineering Co., Cleveland, for a plant to be erected on Chester avenue, near E. Thirtieth street, early next spring for the K-W Ignition Co., Whitney Power block, Cleveland. It will be ready for occupancy about Sept. 15 next. The main building will be a 75 x 200-foot, four-story, steel frame and concrete structure, to be equipped with elevator, etc. There will also be a brick 50 x 116-foot forging shop, to have concrete floors and a steel trussed roof. The question of power has not yet been decided; either a gas engine or motors will be purchased. The K-W Ignition Co., which is a rapidly expanding concern, may soon purchase extra machinery. It uses turret lathes, ordinary lathes, drill - presses, ball - bearing grinders, screw machines, etc.

The Heer Engine Co., Portsmouth, O., is erecting a building, 80 x 160 feet, two stories of steel, brick and concrete. It will be of the monitor type and will be divided into three bays; two side bays and one center bay. The center bay will be equipped with a 5-ton crane of 40-foot span. The other equipment will include whatever is necessary for the manufacture of Heer two-cylinder, opposed, heavy duty gas engines from 10 to 50-horsepower. The new structure will be arranged to allow for further extension in the future. The Heer company reports a good demand for its engines.

The board of public affairs, A. J. Manthey, clerk, Carthage, O., will receive bids until Dec. 17, for furnishing and installing a 60-brake-horsepower, horizontal, gas-driving engine; a vertical, triplex, single - acting, plunger pump, 350 gallons per minute capacity against a pressure of 90 pounds per square inch; an 80-brake-horsepower, driving engine, horizontal, straight line, single-stage, belt-driven, air-compressor, of 520 cubic feet free air capacity per minute against a pressure of 60 pounds per square inch. John W. Hill & Sons, First National Bank building, Cincinnati, are the engineers.

The Cleveland Engineering Co. is receiving bids for a new plant to be erected for the Ohio Blower Co., at Banker and East Sixty-first streets, Cleveland. Work will commence about Jan. 1, and the plant is expected to be in operation by May 1. The main building will be 80 x 128-feet, two stories, and of steel mill construction, and the other will be 48 x 51 feet, two stories, also of steel mill construction. This concern has very little machinery at present and will probably purchase a number of machine tools and two or three machines for its sheet-metal department.

The National Woolen Co. will erect a new factory at 3510 West Thirty-second street, Cleveland. It will be a 105 x 130-foot, three story, brick structure, and will be equipped with an elevator, a heating plant, etc. It will be operated by a number of motors, current for which will be purchased from a power company. This concern is also considering the abandonment of the operating system in its old plant at 3131 West Thirty-second street. If this is done a number of additional motors will be purchased.

The Cleveland Gas Meter Co., W. H. Knight, president, 2178 West Sixty-fourth street, Cleveland, has decided to install an electric power plant in its new 40 x 51-foot building, which is to be completed by March, 1911. A 15-kilowatt generator, with a number of small motors, switches, voltmeter, ammeter and other electrical equipment will be needed. Stamping and other machinery will also be purchased. Matthew T. Shaffer, Cleveland, is the architect.

The James Foundry Co., Clyde, O., has nearly completed its new plant. This consists of a 60 x 80-foot foundry, a 16 x 16-foot engine room, a 25 x 32-foot cleaning room, a 20 x 40-foot pattern shop, a 50 x 200-foot machine shop and sand and coke sheds. A large portion of the machinery has already been purchased.

Bids will be received until Dec. 20, by the board of trustees, Boys' Industrial school, Lancaster, O., F. C. Gerlach, secretary, for furnishing material and installing the additional compressor, piping, etc., for the light, heat and power plant of the school. Harold M. Bush, 69 Fourth street, Canton, O., is engineer.

George F. Hammond, Lennox building, Cleveland, is preparing plans for a large addition to the Hollenden hotel, Cleveland. It is to be ten stories and will be designed to support six extra stories. It will be equipped with four new elevators. Work will commence in two months.

W. A. Dallas, clerk of the board of public affairs, Jackson, O., will receive bids until Dec. 19, for improvements to the electric light plant to cost $11,000. C. C. Slater, Columbus, O., is engineer.

The Brownell Co., Dayton, O., has been awarded contract, for $3,200, for installing a steam and electric generating unit, etc., at the Service quadrangle, Colony farm, Warrensville, O.

CHICAGO

December Business Quiet.—Contractor's Machinery Selling Well.

Judging from the amount of business done during the early part of December, the Chicago machinery market will be quiet until the close of the year. There is, however, a considerable volume of building going on in the territory adjacent to Chicago and this is resulting in fair sales of contractor's machinery, concrete mixing apparatus, as well as boilers, elevators and other machinery for installation in buildings requiring heat or power.

Plans for the construction of a new water supply and pumping station for the town of Wheaton, Ill., are being prepared by J. B. Ryder, consulting engineer, New York. It is proposed to build a 150,000 gallon reservoir, to drill a 75-foot pump well and to purchase a well pump and a high pressure distribution pump. The pumping plant is to comprise a gas producer and two gas eveners. An additional standpipe is also proposed. For a supply of 750,000 gallons daily the cost of a steam plant is estimated at from $7,500 to $8,800. With a producer plant the cost would be from $12,340, to $13,500, if the present standpipe is raised 45 feet to give a higher pressure. A. L. Webster, city engineer, Wheaton, Ill., has the project in charge.

The new plant of the Forsyth Bros. Co., manufacturer of railway supplies, 213 Institute place, Chicago, will be erected at the northeast corner of Sixteenth street and Fifty-fourth avenue, Chicago. The plant includes a manufacturing building, two-stories,

100 x 540 feet; a machine shop, one-story, 50 x 100 feet; a drop forge shop, one-story, 100 x 175 feet, and an addition to the machine shop, two stories, 100 x 140 feet. It is intended to install a power plant to develop 300-horsepower at present and to enlarge it ultimately to 600 horsepower.

The Midland Terra Cotta Co. is having plans prepared by William Krieg, architect, 172 Washington street, Chicago, for a factory to be located near Chicago. The plant will consist of four one-story units, 75 x 150 feet each, and a mill and power house, 60 x 152 feet. The buildings will be partly steel construction, with brick walls, and will be equipped with the latest improved machinery at a cost of approximately $100,000.

The city of Chicago has taken bids on four 300-horsepower water tube boilers which are to be installed in the Roseland pumping station, 104th street and Stewart avenue. The bids received are as follows: Kroeschel Bros., 440 West Erie street, Chicago, $14,200; Edge Moor Iron Co., 164 Dearborn street, Chicago, $14,640, and J. G. O'Neil, 217 La Salle street, Chicago, $14,997.

The Denver, Laramie & Northwestern Railroad Co., Wm. B. Hodge, chief engineer, Denver, Col., is building a three-stall engine house, together with a shop room, 25 x 85-feet, at Utah Junction, Col. Arrangements have been made for whatever machinery will be necessary. The main shops for this railroad will be built at another point.

The finance committee of the city council, Chicago, has recommended an appropriation of $60,000, requested by Commissioner Mullaney of the department of public works for the installation of two electrically driven pumps at the Twenty-second street water works. Power for the pumps will be supplied by the sanitary district.

The contract which was to have been awarded by the commissioners of the Eldred drainage and levee district, Chicago, Carrolton, Ill., on Nov. 11, for a pumping plant, has been postponed until spring when new bids will be requested. The Harmon Engineering Co., Peoria, Ill., is in charge of the engineering work.

Karl Jung and Hans S. Ach, directors in the General Composing Co., Berlin, Germany, have been in Chicago recently making preliminary investigations for the establishment of a factory for the manufacture of the Victor linotype machine, which this company is now manufacturing in Germany.

Louis Kamper, Fine Arts building, Detroit, Mich., has let contract for the structural iron work for a three-story addition, 100 x 100 feet, to the plant of the Detroit Forging Co., 120 Mt. Elliott avenue, Detroit, to the J. E. Bolles Iron Works. The cost of the addition will be $30,000.

The Van Camp Packing Co., Kentucky and River streets, Indianapolis, Ind., has let a general contract for the construction of buildings for a milk evaporating plant at Adrian, Mich. The plant will include a one-story evaporating house, 205 x 90 feet, and a power house, 70 x 70 feet.

The Devore-McGormly Co., Ohio building, Toledo, O., is receiving estimates on a brick and stone factory, two stories high, 125 x 450 feet, for the Marshall Furnace Co., Marshall, Mich. The plant includes a foundry, a storage building and a sand shed. The estimated cost is $40,000.

The Chicago Foundry Co., 2211 North Fifty-eighth avenue, Chicago, has plans in progress to rebuild its building recently damaged by fire. Patterson & Davidson, 98 Jackson boulevard, Chicago, are consulting engineers.

The Willis Shaw Machinery Co., 171 La Salle street, Chicago, contemplates the purchase of a belt-driven air compressor, capacity 400 to 475 cubic feet of free air per minute, the air to be compressed to 100 pounds per square inch.

The Baker Drop Forge Co., Jackson, Mich., W. G. Baker, president, has let the general contract for a new drop forge shop to the Devore-McGormly Co., Ohio building, Toledo, O., for the sum of $20,000.

NEW YORK

Subway and Aqueduct Work Developing.—Quiet Market.

Few machinery orders of any size have come into the local market, and those which have been taken made a small total. Recent inquiries have not extended beyond immediate replacement requirements, and consist of one to two machine lots. There is almost a total absence of big enterprises, other than projects that originated early in the year, and such are dependent mainly upon a return of prosperity. The appearance of several large lists of machine tools and other equipment, is looked forward to by the trade. These are the lists which the Bethlehem Steel Co., the New York, New Haven & Hartford Railroad Co., and the Boston & Maine Railroad Co. have under consideration. The anticipated needs of contractors, who are working on the New York subway, and on the deep pressure tunnel for supplying water to the greater city, also have an enlivening effect. The beginning of these two enterprises will probably not be deferred much beyond 1910. The subway matter is nearing settlement, and bids are asked for on the deep pressure tunnel. The construction of the tunnel will entail an expenditure of about $20,000,000 by the city for about 18 miles of work. Representatives of New York machinery houses, who have recently canvassed the New England and far Western markets, did not return greatly enthused with business conditions in those localities. A somewhat better tone was observed in the west but business in eastern territory was found to be very quiet.

The H. B. Smith Co., Westfield, Mass., has let contract to Casper Ranger, Holyoke, Mass., for the erection of several additions to its plant. These will include a machine shop, foundry and storehouse. The foundry will be 100 x 245 feet, of brick and steel construction, and will connect with the present foundry. The new machine shop will be 100 x 100 feet, two-stories and will be of brick and steel construction. The present wooden storehouses will be removed and a 2-story, iron frame storage building erected. This concern is also completing work on an 80 x 100-foot core shop.

The Cooper Hewitt Electric Co. has incorporated under the laws of New Jersey, with a capital of $2,500,000, to acquire and work patents on lamps in which vapor forms a portion of the conducting circuit. The incorporators are George Whitefield Betts Jr., Englewood, N. J., William Hazen Pick, Glen Ridge, and Ruse D. Alsop, 96 Remsin street, Brooklyn. It is understood that this interest will shortly move its present plant, now in New York City, to Hoboken, N. J., and will enlarge the capacity.

Sealed bids will be received by the board of water supply 165 Broadway, on Dec. 24, for the construction of four sections of the city tunnel of the Catskill aqueduct which will extend from Yonkers to the terminal shaft in Fort Greene park, Brooklyn. The tunnel will vary from 11 to 14 feet inside diameter. The cost of this work will be approximately $20,000,000 and with the subway extensions now developing, it will provide a considerable demand for contractors' and other equipment.

Shapiro & Aronson, 24 Martin street, Brooklyn, manufacturers of gas and electric fixtures, will erect a 100 x 100-foot, five-story factory building, of reinforced concrete construction. Frederick A. Waldron, 37 Wall street, New York, architect and engineer, has charge of the construction. The estimated cost of the building is $80,000, and the equipment $20,000.

The American Locomotive Co. has completed plans for a concrete and brick addition to its former boiler shop building, at Dunkirk, N. Y. The old building will be remodeled, and along with the addition used as a part of the machinery department of the plant.

Mendel Samuel & Sons, 157 Commerce street, Newark, N. J., scrap iron merchants, have acquired a tract of land in Kearney, N. J., upon which the firm will erect a number of buildings and install considerable equipment for the handling of merchant iron and steel.

It is announced that no bids were received by R. Waldo, fire commissioner, New York, on Nov. 29, for furnishing and delivering two gasoline propelled pumping engines.

The Hartford Suspension Co., New York City, has purchased a tract of ground 150 x 190-feet in the Marion district, Jersey City, and will erect a plant upon the site.

The Homichitta Stave Co., Rosetta, Miss. has $10,000 to invest in wood working machinery, saws, engines, boilers, etc.

The Bluff City Lumber Co., Clio, Ark., is in the market for drying and wood working machinery.

The recently incorporated Wasson Piston-Ring Co. will erect a plant at Bayonne, N. J.

NEW ORLEANS

Machinery Outlook Bright—Many New Undertakings.

Although the iron trade is about at its lowest ebb and foundries are running with less than half their forces, the outlook for the machinery trade just now is regarded as good. Reports from various places throughout the south show marked activity in building lines, besides numerous plans for developments requiring oil rigs, drilling machinery, etc. Lumber mills which were burned or fell into disuse during the dull season two years ago are being refitted and re-established. In fact dealers say that industrial activity throughout this region will soon be far ahead of any previous year. In the Caddo parish oil field of North Louisiana the demand for oil rigs, engines, machinery, pipe, tankage and drilling tools is rapidly increasing. Development companies are being daily formed and next month more than 1,000 acres will be exploited. The Vinton field near Lake Charles is also the scene of much activity and machinery men are receiving many inquiries for supplies.

Three-hundred thousand dollars has been appropriated in a bond issue for the rebuilding of the Lake Charles, La., courthouse, jail, city hall and a sewerage system. The city engineer, Lake Charles, will give all particulars. He says he will be in the market for fire escapes, steel railings, hot air and steam heating systems; metal shingles, iron stairways and ceilings, steel cages and cells, safes, vaults, elevators, etc. Specifications will probably be issued next week. A water and sewerage system to replace that destroyed by the recent fire is also under consideration.

A large $600,000 sugar mill is to be built for Lon C. Hill at Harlengen, Tex., by D. J. Hayes. Plans and specifications are not yet out, but Mr. Hill says the mill will be of 600 tons daily capacity. He is also arranging to build 15 miles of standard gage railroad and is in the market for engines, cars, steel rails, etc. Address either Lon C. Hill, Brownsville, Tex., or D. J. Hayes, Houston, Tex., for particulars.

The Creosoted Wood Block Co., organized last week at New Orleans, with a capital of $50,000, is in the market for wood working machinery, tanks, cars, engines, boilers, saws and mill equipment.

The Carolina Planting & Lumber Co., Baton Rouge, which organized last week with a capital of $75,000, wants mill machinery, engines and boilers, saws, etc.

The J. C. Trees oil syndicate has announced its intention to build a large refinery near Shreveport, La. The cost will aggregate $2,000,000 it is stated.

The Independent Abattoir Co., San Antonio, Tex., capital $15,000, was organized last week and wants refrigerators, coolers and a 10-ton ice plant.

The Palatka, Fla., Woodenware Co., has established a factory at Palatka and wants wood working machinery.

The Municipal Excavator Co., Oklahoma City, has $50,000 to invest in steam shovels, engines, boilers and cranes.

The Mendenhall, Miss., school board, M. M. Alsop, architect, wants a hot air system for a $7,500 building.

Bonds for the construction of waterworks systems have been issued by Mineral Wells, Tex., and Hearne, Tex.

The Dyer Timber Co., Morgan City, La., will build a mill and wants machinery and engines.

The Hazelhurst, Miss. Brick & Mfg. Co. is in the market for engines and boilers.

MILWAUKEE

New City Power House is Planned.

Plans are being made by the city of Milwaukee to erect a new power house in connection with its incinerator plant. The plant may be enlarged and it is stated that two more electric cranes are necessary to completely equip the present outfit. Other equipment needed will be clinker crushers and screening apparatus.

The Sheboygan (Wis.) Railway & Electric Co. is installing a new 1,500-horsepower steam turbine in its power plant. Several improvements have been made to the plant during the past few months, including the installation of new boilers and automatic stokers.

After a short shut-down the shops of the Chicago & Northwestern railroad at North Fond du Lac, Wis., have been reopened with a small crew. It is believed that the shops will be running under normal conditions by the first of the new year.

The Kelly-Racine Rubber Co., Racine, Wis., is installing a new Corliss engine in its power plant. The engine was manufactured by the Wisconsin Engine Co., Corliss, and has a fly wheel weighing 15 tons.

KANSAS CITY

Business is Normal—Large Concerns Book Orders.

One of the largest Corliss engine manufacturers in the west reports a heavy business on hand and a desireable volume of inquiries incoming. The larger producers seem more fortunate in filling their books than the smaller concerns. General business remains normal.

The Katz-Craig Co., Omaha, Neb., has the contract for the installation of water works and sewerage systems at Auburn, Neb., and Belle Fouche, S. D.

The Hastings Foundry & Iron Works, Hastings, Neb., has begun construction work on a new plant.

The Hassell Iron Works, Colorado Springs, Col., will erect a foundry department to cost $5,000.

DETROIT

Canvass of Shops Reveals Good Business Conditions—Sales More Numerous.

There has been a very much better feeling in the machine tool business in this district during the last week, and more orders have been taken than in any week for over two months. This has revived the spirits of the dealers and makes the outlook more hopeful. A general canvass of the shops of the city was made this last week in order to determine the exact state of affairs in the various lines of manufacture which are carried on in Detroit. With a very few exceptions, all of the shops are at work again and new men are being added all the time. This applies not only to the automobile business, but to the American Radiator Co., Great Lakes Engineering Co., the Michigan Stove Co., the Peninsular Stove Co., Russell Wheel & Foundry Co., Acme White Lead Co., Berry Brothers Varnish Co., Burroughs Adding Machine Co., Michigan Copper & Brass Co., and the various brass goods manufacturers. All of these companies have plenty of work and expect soon after the first of the year to be running their plants to capacity. It is generally expected that business should fall off in the last month of the year, but thus far the rate has been fairly well maintained.

The Chicago Pneumatic Tool Co. has been enjoying an exceptionally good year and its Detroit plant has every machine tool in use and has added as many new ones as it has had room for. Plans are now being made for a large addition to this plant shortly after the first of the year and this concern's line of electric tools will be manufactured here instead of being scattered among its various plants as at present. This department of its business is growing very rapidly, new designs being added from time to time.

The board of water commissioners, Detroit, will soon take steps toward the enlargement of the water system, and the purchase of new pumping machinery. A bond issue for this purpose will soon be submitted to the voters.

The Fisher Enclosed Body Co., has just let the contract for a new factory building on Oakland avenue, near Pequette street. The building will cost $50,000 exclusive of the equipment.

The Universal Motor Truck Co. placed some more of its machine tool orders this week. It is expected that everything to satisfy the present needs will be purchased by next Wednesday.

The state prison board is planning to erect an entirely new modern prison at Jackson and will ask the legislature for the necessary funds.

The Buhl Malleable Co. placed orders this week for a new air compressor to take care of requirements in the foundry.

The Havers Motor Car Co., Port Huron has just been organized with $65,000 capital.

PITTSBURG

December Promises to End With Business Quiet.

Comparatively little business has been booked in the Pittsburg district since Dec. 1 and the indications are that December will show a new low record for the year 1910. On account of the heavy inquiry for all lines of equipment and machinery noted last month it was generally believed that December would make a good showing, but only in a few exceptional cases have these inquiries developed into actual business and it is now believed that there will be comparatively few important awards made until after the first of the year. Small industrial companies have decided to hold over all improvement and extension work until next year on account of the annual inventory. Owing to the fact that the national corporation tax requires that very careful records be kept, the taking of inventory is far more important this year than in past years and, as a result, many of the manufacturing concerns will have a much more thorough inventory taking this year than in the past. The decision of the railroad companies to postpone buying as long as possible in the hope that prices of materials will be reduced, means that no heavy buying can be expected from this source for a few months at least. The railroads are handling an unusually large amount of repair work at the various division shops, as a result of the decision to repair wooden freight cars instead of buying new equipment and the machinery trade anticipates heavier buying on the part of transportation companies about Feb. 1. Builders of heavy rolling mill machinery report light bookings and state that many of the inquiries noted recently are being held up indefinitely. Iron and steel foundries and builders of cranes and other equipment report a falling off in inquiry.

Following a special meeting of stockholders of the Union Switch & Signal Co. on Dec. 14, to vote on the question of increasing the capital stock of the company from $2,500,000 to $5,000,000, it is expected that definite announcement will be made as to what improvements are to be made to the company's plant. Plans prepared some time ago include extensions to cost $1,000,000 but, it has not been decided what amount of work will be taken up next year.

An electric welding department is to be added to the new plant of the Keystone Tube Co., Connellsville, Pa., which was placed in full operation for the first time on Dec. 8. The company's product will be principally small sized steel pipe. I. W. Bollinger is president, F. C. Perrot, vice president and Col. J. E. McNary, treasurer.

Bids will be asked shortly for machinery to be installed at the new tie treating plant to be erected at Adelaide for the Pittsburg & Lake Erie Railroad Co., the general contract for which has been awarded to W. H. Johnson & Co., Philadelphia. The main building will be 80 x 140 feet.

Brown & Kennedy, of Oil City, Pa., have purchased a building at Franklin, Pa. and will engage in the foundry business. While the company has not announced its plans, it is understood that bids will be invited in the near future for the necessary machinery.

Reports from Scottdale, Pa. state that Jesse A. Stauffer and several associates have purchased a site for a new steel plant, but plans are rather indefinite and the local trade has not been advised as to what machinery will be required.

The general contract for the new machine shop to be built at Charleroi, Pa., by the Macbeth-Evans Glass Co. has been awarded to the Jones & Laughlin Steel Co., Pittsburg. Contracts for machinery have not yet been awarded.

The new plate mill for the West Penn Steel Co. at Brackenridge, Pa., plans for which were outlined recently, will be built by the United Engineering & Foundry Co.

Crushing machinery and electric equipment is being purchased by the Vanadium Mines Co., Pittsburg, for its new plant at Rankin, Pa.

SEATTLE

Much Power Equipment Will be Needed—Outlook Good.

Reports for the past week have been most encouraging in the machinery line and trade is becoming more brisk than had been expected. The sash and door factories are in the market for power equipment and many of them are purchasing new large horsepower engines of the most improved types. Power and light plants are also either installing additional appliances or are getting ready to enter the market for them. The most important announcement in this line comes from Portland where the stockholders of the Portland Railway, Light & Power Co. have voted to increase the capital stock from $15,000,000 to $25,000,000. This company owns the electric power lighting and traction systems in the city and the intention is to construct several miles of additional tracks and more power plants.

The Wheeler, Osgood Co., Tacoma, sash and door manufacturers, has just installed a big hydraulic press in its veneer department and has ordered a new 1,000-horsepower Corliss engine which will be equipped with a rope drive.

The Pacific Power & Light Co. is contemplating the installation of a large switching station at Pasco, Wash., which will be the center for the irrigation belt. It will probably be the largest in the northwest section of the country. All the power transmission lines will converge there.

At an election this week, Ellensburg, Wash., voted to build a municipal water plant which will cost over $300,000. Surveys of the system have been completed and it will furnish approximately 2,500,000 gallons daily.

CINCINNATI

Business is Light—Improvement Expected After Christmas.

The past week has not developed much change in the machine tool situation and the various shops, while normally active, as a rule have comparatively light order books for deliveries outside of the immediate future. Some small orders were unexpectedly received by a few of the tool plants, providing sufficient work to keep them running for some weeks in a satisfactory manner. The bulk of the industries, however, have secured very little in the way of new business and are in some cases merely adding to their stock. The Baltimore and Ohio railroad is said to have bought a medium consignment of tools for several of its shops, but, so far as known, no portion of this found its way into the local market. Machine tool builders are inclined to the opinion that little change from present conditions will obtain until after the holidays.

The new boiler and engine building of Smith & Mills, on Spring Grove avenue will soon be completed and ready for service. This addition is 40 x 60 feet and will be equipped with a new gas engine and generator. Heretofore the company has been securing its current from outside sources, but will in the future develop its own power.

The United States Electrical Tool Co., which recently increased its capital stock from $25,000 to $100,000 has decided to postpone further work on its new plant. The foundation has been completed, and is now ready for the superstructure.

The new plant of the Incandescent Light & Stove Co., Oakley, is being hurried as rapidly as the weather will permit, and, it is expected, will be ready for occupancy in early spring. The plant will be equipped with all modern conveniences.

The industrial bureau has been advised by a manufacturer of automobile accessories that he will remove his plant to this city, if suitable quarters can be obtained.

Harry T. Scully has bought a lot, 50 x 100-feet, in the suburb of Norwood, where he will erect a one-story factory building for the manufacture of molders' tools.

The Ohio Pattern Co.'s new addition is practically finished and the company is now in a position to increase its product very materially.

Contract has been let by the Ontario Wind Engine & Pump Co., Toronto, for the construction of new traction engine warehouse in connection with its Winnipeg branch. The building will be 87 x 100 feet. Other buildings will be put up in the spring.

R. L. Jones, Winnipeg, and J. J. L. Nelson are negotiating with the city of Port Arthur, Ont., for the establishment of a car manufacturing and repair factory, to be capitalized at $350,000.

DEVELOPMENT OF THE UNIVERSAL MILL

The Difficulties Which Beset the Earlier Designs and the Steps by Which Improvement Was Effected

By B. H. Reddy.

In a previous article on the three-high universal plate mill in The Iron Trade Review, Aug. 18, 1910, the leading features of the design and operation of mills of this sort were discussed in a general way.

It is fitting that in continuation, we now consider more in detail a mill which is, beyond a doubt, the first successful one of its type in this country. From experience gained with this mill, others were designed, which have proved very successful. A side elevation of the mill and pinions, as originally designed, is shown in Fig. 1. Other views are shown in Figs. 2, 3and 4. Unless the date of its design, the meagerness of available data at that time, and other things which had to be taken into account, are considered, this mill does not compare at all favorably with some of the more recent mills. When all these attendant circumstances are taken into consideration, however, one can readily see that this mill was a great step forward. Not having had any previous experience with similar mills, quite a long time was consumed in the design and "safeguards" were incorporated, so that in case of a failure, necessary changes could be easily made. Probably the most serious trouble experienced arose from the opposition and prophecies of "old time" mill men, and at that time these had to be given due weight. Having had no practical experience with mills of this type, the arguments of the designer were not always given much consideration, and this feature alone accounts for the major portion of the peculiarities of the original design.

Prophecies of Failure.

Above any other consideration was kept in view the necessity for designing the mill in such a manner that in case of "failure" the "universal" parts could be removed and the mill converted into an ordinary 3-high grooved mill. Under such circumstances the design of the mill steadily progressed, until finally, the orders were issued for the building of it. To those who have had experience with the discouragements frequently encountered by the designer, no more detailed description need be given. As noted above, the type of mill with fixed middle roll was chosen because it could be very readily changed into a grooved mill with fixed middle roll. Again, it was considered wise to have a fixed middle roll and two screw gears, as such an arrangement would permit the "spanner man" to adjust one roll while the plate was being rolled through the other pass; as it was thought that too much time would be lost by waiting on the setting of the rolls. However, in practice this did not prove to be the case. At first sand, instead of chilled, rolls were used, as in case of necessity they could be turned into grooved rolls.

Provisions for Breakdown.

As shown in Fig. 2 the tables were of the simplest kind, and similar to the ones frequently used in some of the old style mills. They were built to be thrown away in case of failure, and were, in a short time, consigned to that fate, as they were the cause of considerable trouble. The rest-bars for the foreplates and guides were not placed to the best advantage for the size and style of mill. All this was not merely the result of chance and snap judgment, combined, but of careful consideration of the controling conditions and difficulties. The all absorbing question "In case the mill is not a success, what can be done with it" was kept constantly in mind, and, in the main, governed the design. Had the mill not proven a success, the tables would have been removed; the sand rolls grooved; the vertical rolls and their housings removed; other guides and foreplates would have been put in place; the hydraulic screw gears would have been removed and replaced by the ordinary hand-gear, and the universal mill would have become an ordinary 3-high hand mill with grooved rolls. Only the unusual lugs and bearings on the housings would have remained in view as reminders of an unsuccessful experiment. These so-called safety features were opposed as strenuously as possible by the designer, who had confidence in the new mill, but to no purpose. The question of the "slip" between the plate and the verticals was the cause of considerable discussion. Finally, the fears of the "old style" mill men were quieted by means of the clutch shown at *A* in Fig. 1. This was designed with the view of allowing the vertical rolls to be drawn ahead of their driving shafts in case the pull of the plate would be heavy, the inclined surfaces of the clutch jaws permitting their slipping past each other. The loose clutch was intended to be actuated by the spiral spring shown, but in practice, the clutch was never observed to operate in that manner.

However, the clutch served the purpose of overcoming a bugbear. So positive were the convictions of some that the mill would not accomplish the purpose of its designer, that the mill was intended merely for roughing. Therefore the shoeplates were prolonged and a 3-high grooved mill was set beside it. This mill was followed by a 2-high bull-head for the finishing. The three mills were in line on the same shoeplates and were to be driven by the same engine. The spindle carriers were designed to give the usual movement thought necessary, and were later changed to more substantial design.

The Roll Adjustment.

The bottom screw gear was the cause of considerable worry, as it was thought the scale from the rolls would necessitate frequent renewals. A simple shield was designed which so thoroughly accomplished its purpose that the bottom gear gave much less trouble than the top gear, for which none had been anticipated. This bottom screw-gear has worked without trouble for more than one year at a time without adjustment. As the mill was at first intended merely for making the roughing passes, semi-automatic stops were designed so that the setting of the rolls could be done by a comparatively unskilled man, who would merely have to operate a lever after each pass, and the stops, which had been set previously by the roller or some other skilled man, would limit the travel of the rolls. It was not thought that great accuracy was required for the roughing passes, the hand-wheel for setting the bottom gear stops being shown at *B* while the top gear stops are shown at *CC*. However, this was soon discarded,

as were the side guides shown at *DD* in Fig. 2, it being found that the vertical rolls were better side guides than anything else. At *E* in Fig. 3 is shown an arrangement for leveling the rolls. This is accomplished by revolving the main-screw nuts, through the medium of a small worm engaging in a worm gear attached to the nut. This proved to be a very successful and convenient arrangement.

Some of the Difficulties.

As originally designed the mill was run as indicated by the arrows in Fig. 2 and was set with the long verticals on the furnace side. As quite frequently happens when a new machine is tried out, difficulties developed, of which the greater number were due to the small parts being too light. After some experimenting it was decided to turn the mill about, which was accordingly done, thereby putting the short verticals on the furnace side. At the same time, some of the guides and other small parts were redesigned and strengthened. With the rolls revolving in the opposite direction the material being rolled passed through the horizontal rolls first and then through the vertical rolls. Here new difficulties developed and it was found that while it was possible to rough faster with the mill placed in this manner, when the plate was reduced to about seven-eighths of an inch in thickness it became more difficult to finish, and this part of the rolling became slower. With the verticals on the delivery side heavier drafts could be given. Notwithstanding the greater spread of the slab under these drafts, it would still be taken by the verticals. However, it is much more difficult to roll a straight plate with the mill arranged in this manner, for if the plate is crooked in the slightest degree, or if it is not exactly perpendicular to the center line of the mill, it will travel along the face of the horizontal rolls, which will cause it to climb the face of the verticals and spoil the plate. From this experience, it was decided to turn the mill about, but as a more economical expedient, the engine was reversed. From this time on no trouble was experienced in rolling anything that was required within the capacity of the mill. This mill has a range in widths of from 15 inches to 42½ inches. After the mill was supplied with tilting roller tables and the small parts properly arranged the following sizes were regularly produced:

42½ inches in width by 0.226 inch in thickness
40¼ inches in width by 0.218 inch in thickness
22 inches in width by 0.172 inch in thickness
15¼ inches in width by 0.148 inch in thickness

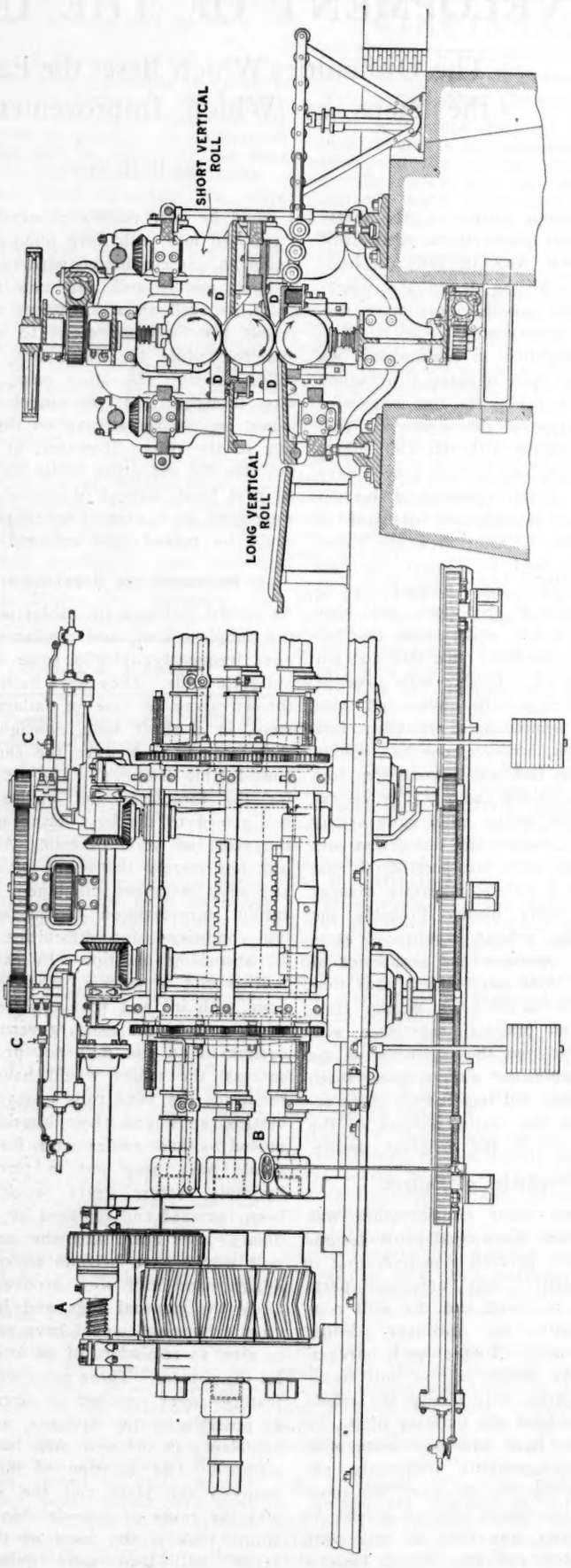


FIG. 1. ELEVATION AND CROSS-SECTION OF FIRST MILL.

FIG. 2.

In Figs. 5 and 6 are shown views of the mill as it was rebuilt. Arranged as shown it has been remarkably successful in producing economical results.

It will be noted that a roller was added at *F* in Fig. 5. This was found necessary, as when rolling short slabs they would lie on the foreplate, there being nothing except the momentum imparted to the slab by the horizontal rolls to carry them out onto the table. With the vertical rolls on the ingoing or receiving side, no trouble will be experienced from plates working across the face of the horizontal rolls, no matter how the slab or plate may come to the mill. While roughing cannot be done as rapidly when the plate enters the vertical rolls before entering the horizontal rolls, it is far easier to roll straight plates and to finish. Contrary to the usual practice on other rolling machines, this mill takes the first pass and finishes between the top and middle rolls, as it was found by experience that by rolling in this manner, it was easier to roll a more perfect plate in gage, uniformity, flatness and in straightness.

Efforts to Discredit the Mill.

In connection with the design and operation of this mill, a number of amusing occurrences took place. Notwithstanding the elaborate precautions taken in case the mill should not work, the new mill worked fairly well and economically at that. The 3-high grooved mill and the 2-high "bullheads" were never used, but were taken away, together with the hydraulic shear which was so carefully placed in line with the bullheads. On the old style grooved mills one length was all that could be rolled, but it was decided that the mill might roll two lengths and the shears were ordered so placed, under protest. A short time after the mill had been placed in operation a mistake (?) was made in the size of the slab and a three length plate was rolled. Orders were later issued for the removal of the shear and it was moved back, but not as far as the mill men desired and later another mistake (?) was made and a 4-length plate was rolled and laid beside the mill for benefit of the management. One of the disadvantages of this style mill lies in the fact that with a fixed middle roll it is difficult to get the proper rigidity for this roll. If the fastenings or bearings for it are of sufficient strength, the roll neck is likely to be weak, and vice versa. Again, the capacity of the mill for thickness of slabs is very limited, for should much travel be given the horizontal rolls, it will require a steep incline downward from the first table roll to the bottom main roll on the receiving side and a corresponding upward incline to the first table roll on the opposite or delivery side of the mill.

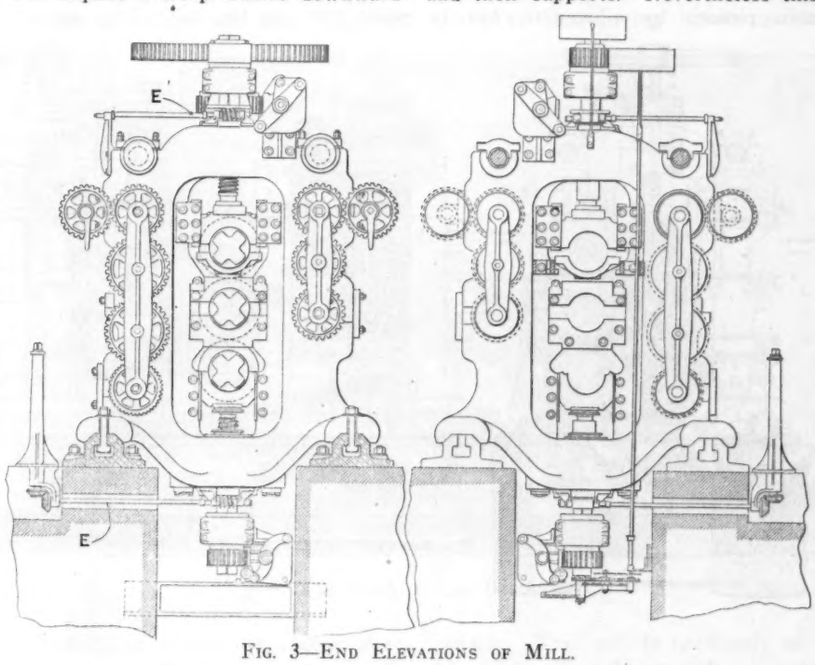


FIG. 3—END ELEVATIONS OF MILL.

This makes rolling that is hard on the mill, foreplates, guides, etc., especially if the slab is at a rather low heat, because the slab must be bent upwards by being drawn between the rolls while the rear end is held up by the foreplate and on the opposite side the front end is forced upwards by the bottom guides. This results in giving the slab quite an upward curve and in quite a bit of trouble from the breaking down of the foreplates and from the slab catching on the guides and forcing them and their supports out of place. This was occasionally varied by the slab taking out the first table-roller in addition to the guides and their supports. Nevertheless this mill has done excellent work and was a great step forward.

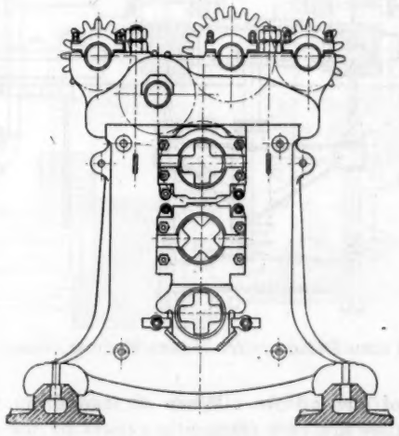


FIG. 4—ELEVATION OF PINION HOUSING.

The New Design.

After the experiments with this mill the writer began the design of a new universal 3-high plate mill of a somewhat different design, and which is shown in Figs. 7 and 8. This mill was designed with the object in view of using as many of the details of the above described mill as possible without interfering with any of its improvements. This was done in order to save pattern work, and to reduce as much as possible the number of spares required. This refers especially to such parts as spindles, coupling boxes, gears, etc. As both mills were owned by the same company, the question of interchangeability of parts assumed considerable importance. Notwithstanding this feature there is a great difference in the two mills. In this mill the bottom roll is fixed, therefore the bottom screw-gear was dispensed with. Another advantage possessed by this mill is the fact that the level of the bottom roll, relative to the tables, does not change. This makes the bottom pass straight and consequently the slab is not bent in making this pass. Again, due to this feature, the tendency to break down the foreplate and to force out the guides and roller, shown in Fig. 7, is avoided. Ordinarily a plate mill with a loose middle roll has this roll of a smaller diameter than the other two

rolls, being usually about two-thirds their diameter. Being of a smaller diameter, it is not driven from the main pinions by a spindle, but is driven by friction from the main rolls. However, in this mill the three rolls are all of the same diameter, and are all driven from the main pinions. Attention is called to the long bottom guides, which possess a number of advantages over short ones. As usually designed, these guides on the back end have a short hook which rests in a groove in the top of the rest-bar, while the sharp, chisel-shaped point rests on the roll. This groove fills with scale from the material being rolled and, due to the jarring of the mill, this scale works under the guides and gradually raises them out of the groove. When so raised up, they are very frequently caught by the steel passing through the rolls and thrown out. This is especially true of light and of narrow guides. The writer has seen cases where guides of this style have been caught and forced through the slab. By making these guides wide and very heavy, these difficulties can be overcome. With the bottom guides as shown in Fig. 8 none of these difficulties have been experienced. Instead of a groove to catch and hold the scale, the top of the rest-bar is rounded, so that scale, etc., will not lodge.

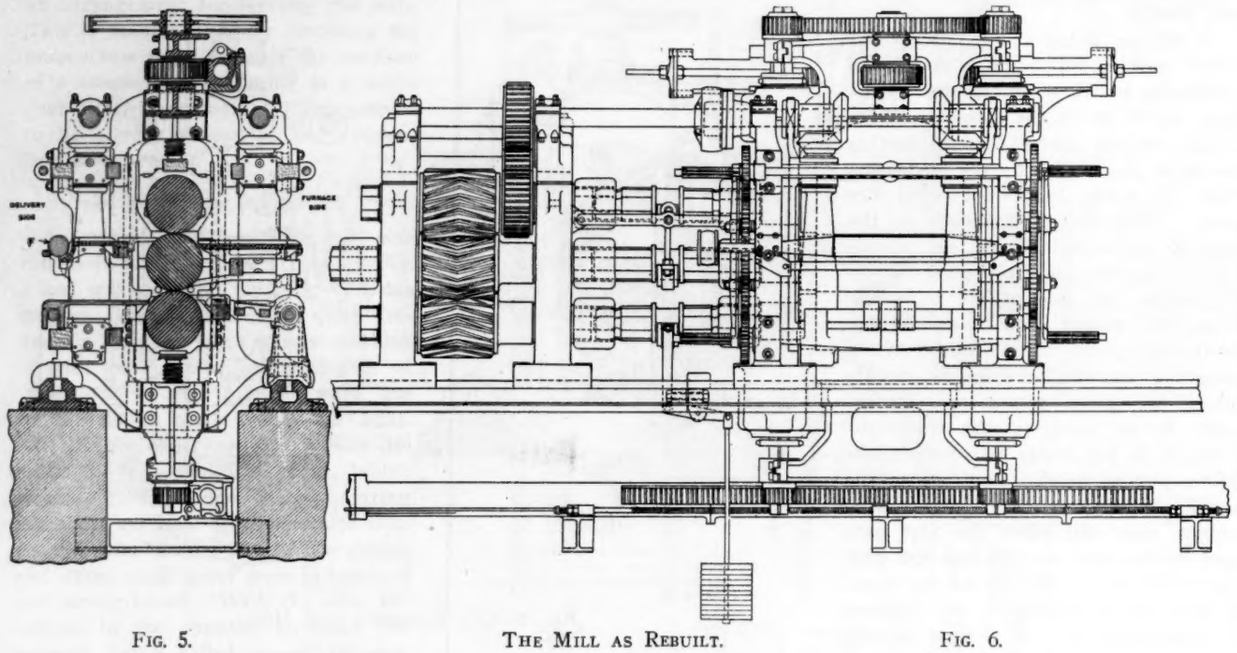


FIG. 5. THE MILL AS REBUILT. FIG. 6.

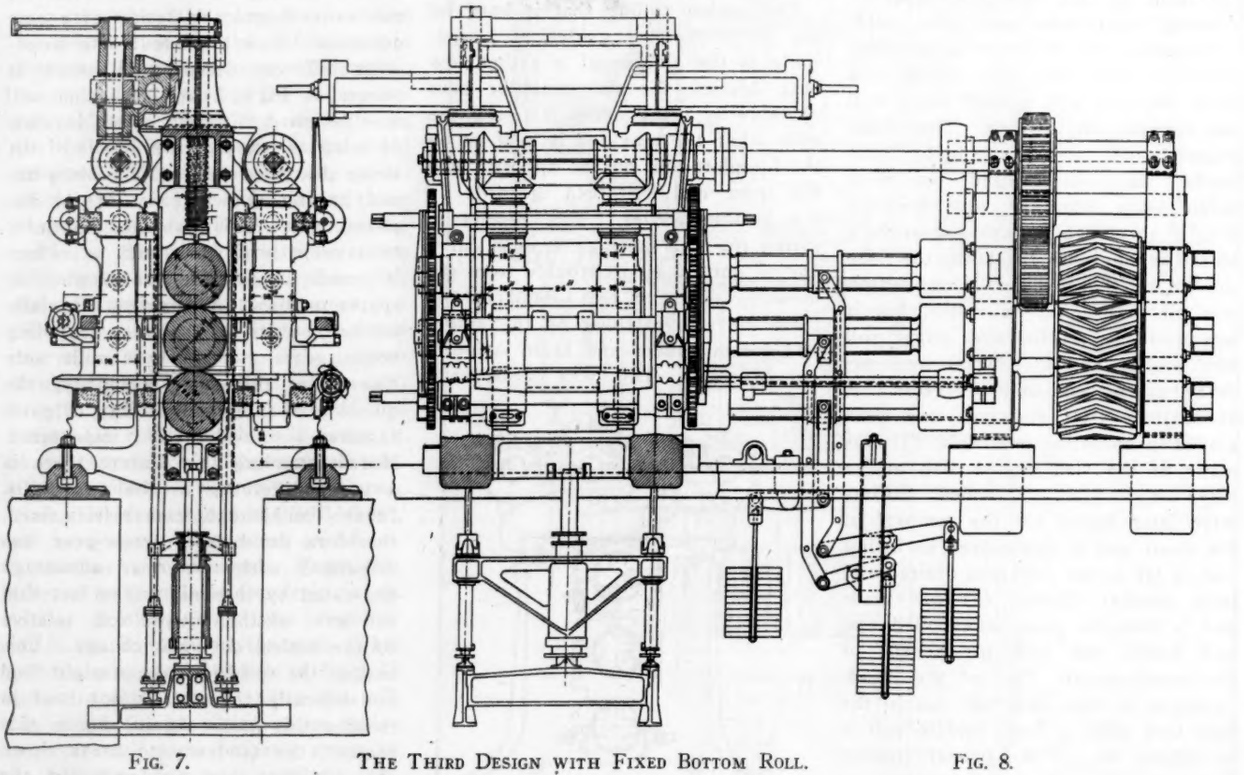


FIG. 7. THE THIRD DESIGN WITH FIXED BOTTOM ROLL. FIG. 8.

Being long, the guides lie flat, and in addition will permit of greater wear before having to be changed. The rest-bar can be located where it can be of ample dimensions for the service required, and where a secure attachment can be obtained, with the roll housing. With a short guide the rest-bar must be placed in an already crowded location, where the designer will experience difficulty in securing an adequate attachment to the middle roll bearing. It is perhaps proper that attention be called to the supports for the spindles, and to note that they were used but a short time as shown and were then replaced with others of a more substantial design. Another feature that deserves notice is the fact that the driving miters on the vertical rolls are placed next to the main housings, instead of between the vertical rolls. When the driving gears are so placed, the bearings for the vertical rolls do not have as long life, as if they are placed on the outside as shown. No doubt this is due to the action of the driving gears when in this position, which tends to force the roll out of its bearings, as soon as the slab has passed through. This allows the lubricant to work into the bearings. In the designing of a certain mill of this kind, in order to reduce the number of gears, and also the cost, the driving gears were placed on the outside on one side of the mill and on the inside on the opposite side. This was necessary to obtain the proper direction of rotation of the vertical rolls. After some experience with this mill in actual operation, there was enough difference in the life of the bearings, roll-necks, gears, difficulty in keeping the rolls in alignment, etc., to induce the management to replace the pinion housing caps, vertical roll housings on one side of the mill, and to make the other necessary changes in order to place all the driving miters on the outside. This mill is used only as a roughing mill, a 3-high mill, on which the finishing passes are made, being set tandem with it. These are usually three in number and under the conditions of rolling, length of plate, etc., the time consumed in these finishing passes is ap-

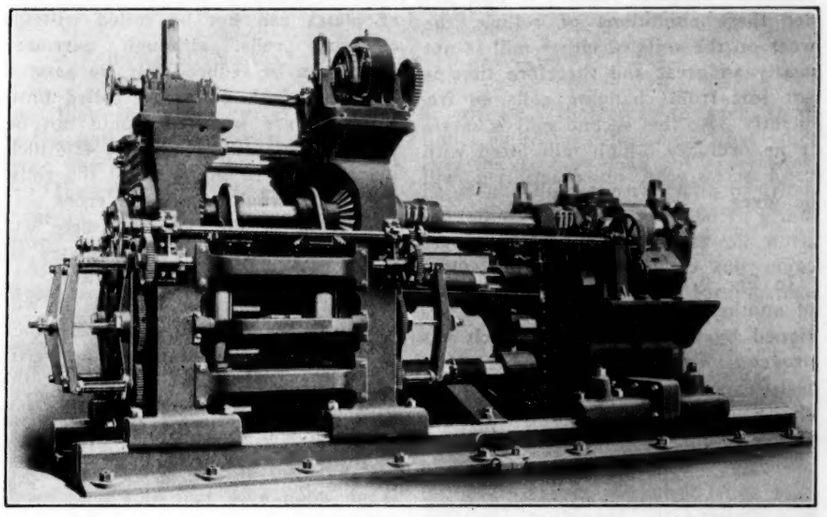


FIG. 9—A LATER DESIGN.

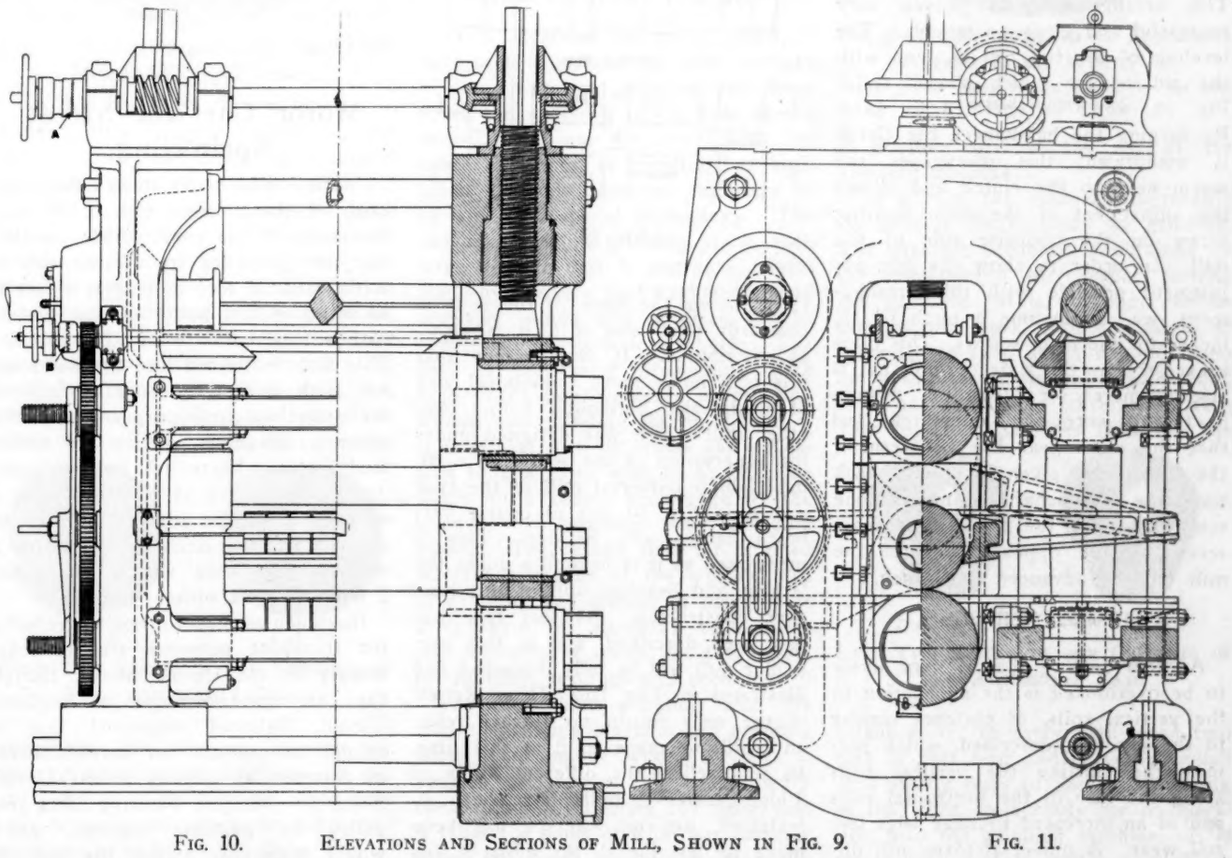


FIG. 10. ELEVATIONS AND SECTIONS OF MILL, SHOWN IN FIG. 9. FIG. 11.

proximately the same as required for the roughing passes, and therefore by the addition of this second-hand mill, the capacity of the first mill has been doubled. Another feature is that under these conditions of rolling, the wear on the rolls of either mill is not nearly so great and therefore time is not lost from changing rolls so frequently. As this second mill is merely an ordinary 3-high mill fitted with hand screw-gear, no description will be given.

The Modern Mill.

In Fig. 9 is shown a general view of another style of universal mill designed by the writer, and which has proven able to produce very economical results. The construction is shown more clearly in the part sectional views in Figs. 10 and 11. This mill has the long hinged bottom guides and foreplates possessed by the mill, previously described, but is much larger and heavier. The middle roll is of smaller diameter than the top and bottom rolls, and is driven from them by friction. The carrier for this roll is merely an open top bearing and is lined with babbitt. This arrangement has proven very successful and gives no trouble. The leveling of the top roll is done with the aid of the clutch shown at *A*, Fig. 10, which is operated by hand. By turning the handwheel, the clutch is withdrawn; this disengages the worm next to the clutch and allows the adjustment of the main housing screw on the opposite side of the mill. In order to show the fine adjustment possible with this arrangement, we can assume a pitch of 1½ inches for the main screws. This pitch is excessive for this style of mill, but is assumed merely for illustration. Assuming that the worm is double thread and that the worm-gear has 60 teeth, if the clutch be given 25 teeth, each time the wormshaft is moved one tooth space of the clutch, the main screw on the opposite side of the mill will be advanced 0.002 inch.

Unequal Roll Wear.

Another feature that is very likely to be overlooked is the application to the vertical rolls, of clutches similar to the one just described, which permits the shifting the vertical rolls along the face of the horizontal rolls and of an increased tonnage with less roll wear. A universal plate mill differs very much in the wear of rolls from an ordinary plate mill. In the latter the plates can be shifted along the face of the rolls, and the wear distributed, while in the former, as usually designed, the wear is at one place only, on the horizontal rolls, which means that if a fair sized tonnage be rolled of any one width, wider plates can not be rolled without changing rolls, although narrower plates can be reduced. If we assume that 40¼ inch plates be rolled until the rolls are worn, it would not be advisable to attempt to roll 42½-inch plates. Due to the wear of the rolls, the plates would appear in cross section as at *A*, Fig. 12. But there will be no difficulty in rolling plates of less width than 40¼ inches wide. If the vertical rolls be shifted, it will be possible to roll, say 20¼-inch skelp and then by shifting the vertical rolls, 18¾-inch skelp on the other end of the horizontal rolls, and so on down, thus reducing the wear by distributing it over the entire face of the horizontal rolls. At *B*, Fig. 12, is shown the wear of the rolls as ordinarily used, and at *C* it is shown as distributed. It is apparent that this is a much more economical way of using the horizontal rolls. Another mill which was designed under the supervision of the writer, is a 60-inch 3-high universal mill of the type shown in Fig. 10, but of course very much larger and heavier. This is mentioned as it is beyond a doubt the largest and heaviest mill of this kind ever constructed. As this type has just been described, and as this particular mill will be fully described and illustrated in THE IRON TRADE REVIEW in the near future no further reference will be made to it at this time. In this article the different kinds of 3-high universal mills have been illustrated, but no attempt has been made to describe all the mills of this kind, even if they are few in number, it being the intention to only describe and illustrate the class in a general way.

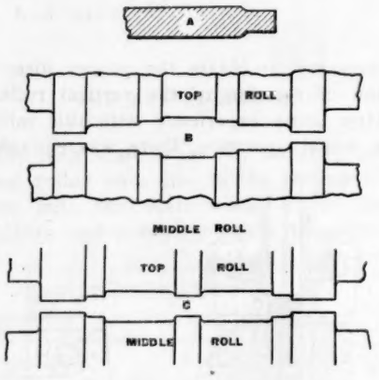


FIG. 12.

Rapid Concrete Laying at Panama

All hourly records for concrete laying are said to have been broken on Oct. 6, by two Lidgerwood cableways used in placing concrete in the locks at Gatun. These cableways are arranged in duplex form on four pairs of towers, the pair with which the record was made being known officially as strands A and B of cableway No. 1.

Strand A is credited with having placed 49 cubic yards in one hour and strand B 50 cubic yards during the same hour. This means that the carriage on each strand made 25 trips per hour, which is 25 per cent above the maximum rated capacity.

An interesting feature of these cableways is the high carriage speed adopted, which is much higher than ever before attempted in this class of work and which runs up to 2,500 feet per minute as compared with 800 or 900 feet per minute as the former maximum in similar transmissions, and which have been made possible by recent improvements. The cableways have each a span of 800 feet and are actuated by electricity, one operator controlling entire operation of each strand.

Motor Cart for Street Sprinkling

Consul Albert Halstead, Birmingham, England, says that a British manufacturer has constructed a watering cart propelled by steam, with a water tank 13 feet in length, 4 feet 6 inches diameter, built of steel plates, with a total capacity of 1,200 gallons. This tank is divided into two sections, one with a capacity of 1,000 gallons for street-watering purposes and the other a 200-gallon section for boiler feed water. There are two independent spray boxes at the rear with a spray that can be adjusted from 4 to 30 feet. It is calculated that with a medium spray the wagon can water 2 miles of road without refilling.

Inasmuch as steam-propelled vehicles for transport purposes are not customary in the United States, though they are quite common in England, Cousul Halstead suggested that it should be possible for manufacturers of commercial vehicles in the United States to construct watering carts propelled by gasoline engines, which would materially lessen the cost of street watering, and by their greater speed and carrying capacity should do the work of a number of horse-driven watering carts.

THE FIELD FOR GRINDING[1]

How the Intelligent Use of the Grinding Wheel Improves Both Quality and Output

By C. H. Norton.[2]

Grinding in various forms has been known to man from the very beginning of history, yet it is doubtful if many engineers have a clear conception of the field for metal grinding. Experience (as a specialist) covering twenty-five years has taught me that the usual thought of grinding is that

Fig. 1—Microphotograph of Chips from Modern Grinding Wheel.
Note resemblance to lathe chips.

it is a slow, tedious, expensive, but sure method of obtaining accuracy, and that where great accuracy is not required grinding should not be done. When, within the recollection of the writer, mechanics made their own solid glue and emery wheels with which to grind small hardened tool work, it did not occur to them that they could do by grinding a certain part of the work that they were using steel tools for, because it was grinding, and was slow. Moreover, all nice work must of necessity take lots of time, because our older mechanics had said so. It did not occur to them that we could ever have better grinding wheels and better machines in which to use them.

Fig. 3.

Fig. 4.

First Two Stages in the Grinding of an Automobile Cam.

It was at this point in our reasoning that the majority of engineers rested and it is here that we find a large number now. All engineers admit the exactness of grinding, but most of them still believe it to be slow.

Appleton's Cyclopedia of Applied Mechanics, published as late as 1893, says that emery wheels are employed mainly for producing cutting edges and for smoothing surfaces. Again it says that in all cases of the employment of emery wheels in place of steel cutting tools, the operation is considerably slower, and it may be laid down as a rule that save upon metal too hard to be operated upon with steel tools, the emery wheel cannot compete with the ordinary lathe, planer, milling tool, etc. My observations convince me that a great many American engineers hold the same views.

What the Wheel Will Do.

As a specialist for many years, I have seen a gradual but sure increase of knowledge of grinding and have noted the widening of the field as the result, but I am not aware that the intelligent study of grinding has been taken up by professional engineers or by any institute of technology. The intelligent use of grinding yields such large returns that it warrants careful study by the very best engineering and scientific minds and a place in the courses of our technical schools. The field is constantly broadening with each year's improvements in grinding wheels and grinding machines, and it is time that men of brains and education took a hand with us to help the world to a better knowledge of the science of grinding and grinding wheels. The results thus far attained warrant a change of the world's idea of grinding and instead of using it as a synonym for slowness, tediousness and drudgery, it should be a synonym for rapidity, accuracy and economy.

The fact about grinding with the modern grinding machine and grinding wheel (not emery wheel) is that it enables us to size all round work cheaper than by turning and filing, that it takes the place of what we formerly called the finish cut of the lathe and all filing, giving us not a theoretical perfect cylinder or perfect finish, but a much nearer perfect cylinder and finish that we obtained with the lathe. It gives us diameters to such small limits as to be called exact, but whoever insists that none but exact work be ground loses the very pith of grinding, which is economy. Modern grinding means cheaper cost for all work, many grades of work to suit many requirements, and cheaper turning than

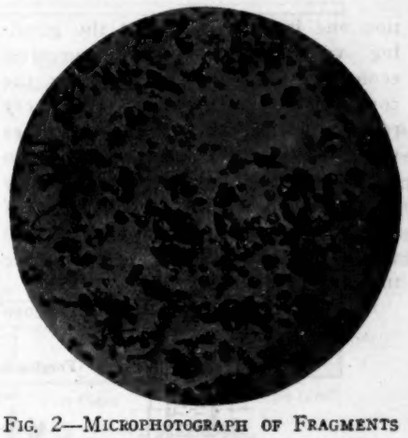


Fig. 2—Microphotograph of Fragments from Emery Wheel.
Many of the particles are melted by the heat generated in grinding.

is possible without the use of the grinding machine.

As a rule, the coarser the turning the greater the economy by grinding. The greatest economy is obtained by the combination of cheaper turning and grinding. It is no longer necessary to turn work smooth, straight or correctly to size, and the lathe is no longer necessary as a precision tool. If it has a carriage traverse of from four to ten threads per inch, has sufficient power to carry high-speed tool cuts at that feed and is well supplied with steady rests to prevent springing of the work, it is ready for co-operation with the grinding machine. It is easier with modern grinding machines and wheels to grind off a given amount of metal when in the form of crude screw threads than in any other form, and with long work having several

Fig. 5.

Fig. 6.

Last Two Stages in the Grinding of an Automobile Cam.

[1]Abstract of paper read at New York meeting of American Society of Mechanical Engineers, December, 1910.

[2]Norton Grinding Co., Worcester, Mass.

sizes the grinding requires less time if 1-32 to 5-64 inch is left on the diameter for grinding than if the work is turned carefully to within 0.002 to 0.005 inch. In all cases, accurate turning increases the total cost of production and in some it makes the grinding very expensive. The greatest economy is usually obtained by the combination of grinding with very rough turning. Yet there are cases where the least expensive way is to grind direct without turning, notably the greater part of crankshafts of automobiles and small gas engines and very long and slender work where turning is difficult.

FIG. 7—DOUBLE CAM GROUND FROM 2-INCH ROUGH STOCK.

It is not an easy matter to secure such rough turning as true economy requires in connection with grinding. Lack of knowledge of what is needed, coupled with the natural pride the workman takes in doing what tradition says is nice lathe work, prevents the grinding machine from doing what it is ready to do. Our industries are losing much while waiting for the engineer to assume the intelligent guidance of foreman and workmen who, through fear, doubt or prejudice now rob us of the great economies due to modern grinding machines. There is much yet to be learned by foremen and workmen about turning. High-speed steel makes possible much that has not as yet become common knowledge.

The lathe is a very old tool and foremen and workmen have known it for generations, yet I have been unable to find more than two instances where a careful study has been made of the combination of lathe work and grinding to effect the maximum saving. I have observed that lathe men have not tried to remove metal by increasing the number of cuts and using fast traverse. When urged to take coarse feeds to help the grinding machine to effect a total saving, they have invariably said that they were feeding all that the work would stand. It has been demonstrated that three cuts with a carriage traverse of 6 per inch produced certain work in 9 minutes that required 13 minutes to turn in one cut, because the work was so frail that with one cut no faster feed than 32 per inch could be taken. The rough-ridged surface was readily ground by taking one minute more than when the turning was finer, the net saving for the job being three minutes. In many cases the ridged surface requires no additional time.

In another case where the work was quite firm and was being revolved at a very high speed with a view to getting everything possible from the high-speed tool, the turning required five minutes and the grinding one minute. A change was made in the feed of the lathe so that without revolving the work any slower it was turned in one minute, leaving a very crude, crooked and bad-looking piece of lathe work. The grinding then required two minutes, but the net time saved was three minutes. What did it matter how bad looking a lathe job it was if the finished work was perfect and three minutes was saved?

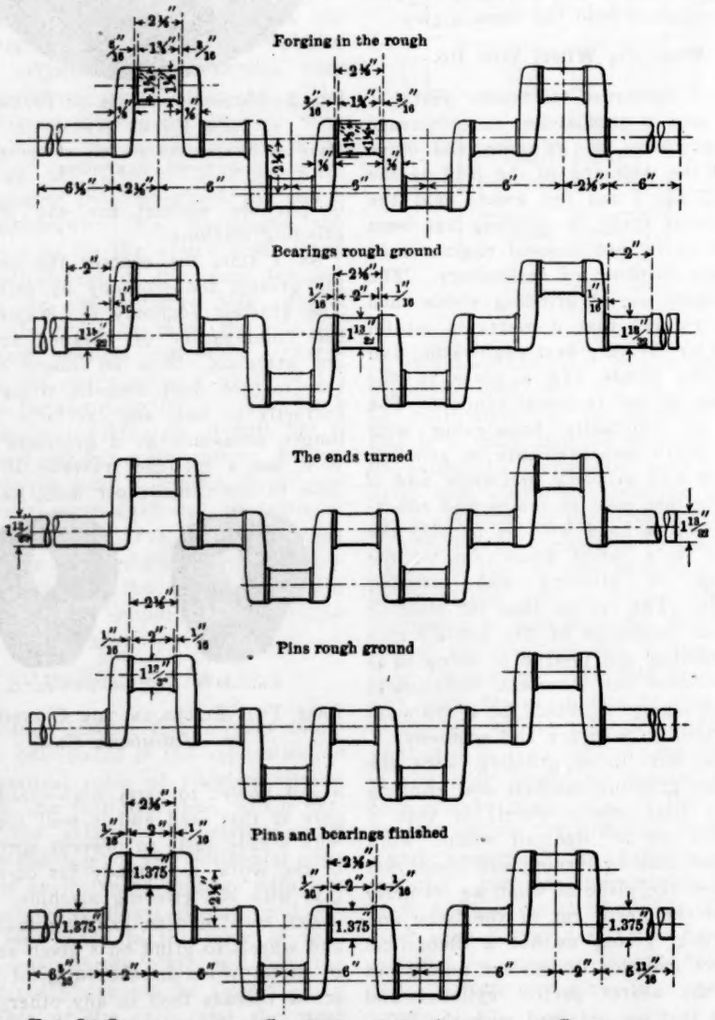


FIG. 8—STAGES IN THE GRINDING OF AN AUTOMOBILE CRANKSHAFT.

Grinding Makes Old Tools Useful.

There is a rich field for engineers and managers in connection with the lathe and modern grinding. Recent lathe designs provide for high speed of revolution, with sufficient power, quick change to and from back gears, and sufficient rigidity to utilize to the limit high-speed steel; but much work is not of sufficient rigidity to permit the maximum use of the tool at fast traverse and deep cuts. In addition, there are thousands of lathes of old design that will not be thrown away at once. There is, therefore, an opportunity to get much more out of present plants by cheaper turning, *because of grinding.*

Developments warrant the conclusion that we should no longer assume that simply because a tool is a grinding wheel it cannot remove metal and size and shape work as quickly as a steel tool. Rather, we should use the steel tool when it can be made to remove metal, size and shape work cheapest, and the grinding wheel when it excels. It is no longer to be taken as a matter of course that we can turn, plane and mill faster than we can grind. After all, the real reason we remove metal is to accomplish certain finished results, not simply to secure a certain number of pounds of chips in a given time. Before long I think all progressive engineers will understand that

both the grinding wheel and the steel tool have their place for metal cutting. The old thought of abrasion must give way to the new thought of cutting.

While it is still true that poor wheels or good wheels poorly selected and wrongly used will still remove metal very slowly by abrasion, it is also true that the old-fashioned milling cutter, with fine teeth cut by hand with a file, hardened but never ground, and used in the old-time slender milling machine would very slowly abrade the surface. The modern grinding wheel, used in a modern machine by a modern man, is just as surely a milling cutter as if it were made of steel.

The microscope reveals the fact that such a wheel cuts off chips. Fig. 1 is from a microphotograph and clearly shows the chips that are as surely cut off as those made with a steel milling cutter. The grinding wheel used was a modern one made of crystalline aluminum oxide.

Fig. 2 is also from a microphotograph and shows the result of the old-fashioned abrasion described by Webster as grinding to powder. Here we see the effect of great heat, the greater part of the powder being in the form of globules. This is magnified to the same extent as Fig. 1 and shows the vast difference between the old-time abrasion to powder and the present cutting chips. A large part of the energy put into work was wasted in heat, as shown by the very small globules in Fig. 2. The wheel used for Fig. 2 was an emery wheel like those referred to in Appleton's Cyclopedia of 1893.

Some Typical Examples.

The grinding wheel as now made is really a milling cutter with millions of cutting teeth. Although these teeth are not as large or as strong as the teeth of a steel cutter and therefore cannot cut as deeply, yet they are capable of cutting at much greater speed. Since there are so many more of them they are capable of much more work in a given time when the nature of the work is such that a large number of these cutting points

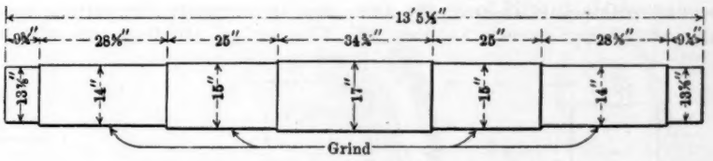


FIG. 9—ENGINE SHAFT; HAMMERED FORGING.
Weight, 8,000 pounds; stock removed 0.025 inches; limit, 0.001 inch; time, 6 hours.

can be used simultaneously. In some cases we can use as many as two billion cutting points per minute. Eight hundred million per minute is not uncommon and four hundred million per minute is very common.

The modern grinding wheel, mounted in a good machine, can be used at a cutting speed of 6,000 or more surface feet per minute and owing to this high speed it need not cut deeply relative to the rigidity of the work. Therefore it is able to remove metal from many forms of work more quickly than the milling cutter or the lathe tool.

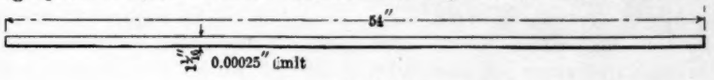


FIG. 10—SHAFT 0.30 CARBON STEEL.
Stock removed, ⅛ inch; time, including setting up, one hour.

The accompanying illustrations show a notable example. Figs. 3, 4 5 and 6 show the process of making automobile cams. An order for a hundred of these cams was received and our shop superintendent began to provide means for producing them at the lowest possible cost. It is evident that drop forgings for so few would be out of the question, as the expense of dies would make the cost of the cams prohibitive. It was therefore necessary to devise means for producing them from the bar stock. This was done by providing an eccentric chuck for the automatic screw machine. To prevent the bar from turning in the chuck while feeding forward, the spline was made the full length and a mating key was placed in the chuck. Pieces like Fig. 3 were made in the automatic machine at the rate of 10 per hour. A keyway in the hole was made in the ordinary way, Fig. 4. These blanks were ground to rough shape, Fig. 5, at the rate of 10 per hour. The cams were then hardened and finished

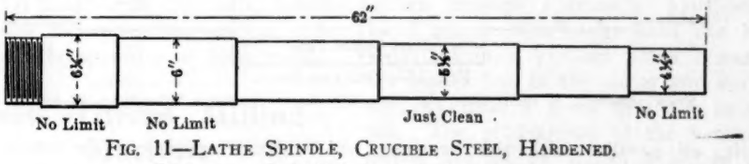


FIG. 11—LATHE SPINDLE, CRUCIBLE STEEL, HARDENED.
Stock removed, 0.035 inch; 1¼ pieces per hour.

ground to Fig. 6 at the rate of 40 per hour. It should be clear that such a cam could not be milled to shape from the blank in nearly so short a time with the milling cutter. When manufacturing such cams in large numbers drop forgings would be used, and here again the grinding wheel is quicker than the milling cutter.

Another case where the grinding machine can accomplish the results desired in less time than the lathe is that of the pins and bearings of the automobile crankshaft. The results desired are as follows: Five bearings,

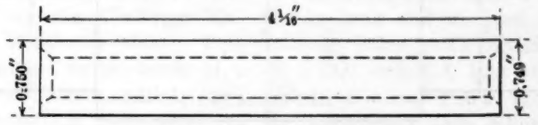


FIG. 12—PISTON PIN, 0.15 CARBON STEEL, HARDENED.
Stock removed, 0.015 inch; limit, 0.0005 inch; time, 60 pieces per hour.

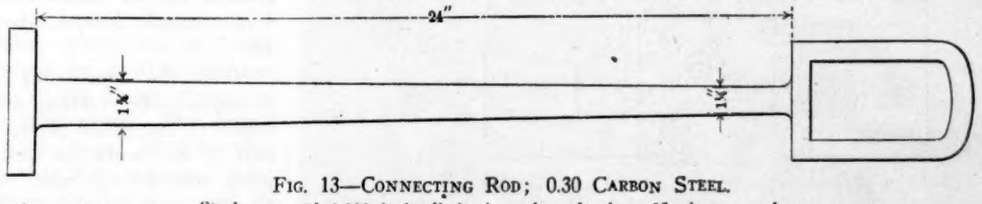


FIG. 13—CONNECTING ROD; 0.30 CARBON STEEL.
Stock removed 0.008 inch; limit, just cleaned; time, 25 pieces per hour.

all around within 0.00025 inch; the axis of all parallel and exactly in line; all of the right length within 0.004 inch; distance between bearings within 0.004 inch; accumulated error not over 0.008 inch. Four crank pins, all round within 0.00025 inch; the axis of all exactly parallel; all to length within 0.004 inch; all parallel with the bearings; all within 0.005 inch of the same plane; all of correct throw, within 0.010 inch; overall length, accumulated error not over 0.008 inch; and all fillets correct radius and exactly concentric with the bearings and pins; all bearings and pins straight within 0.00025 inch; and all a good, smooth surface.

In the case of cranks designed with clearance for the arms of the cranks, as shown in Fig. 8, the width of the wheel is identical with the required length of the pins and bearings, so that no measuring or setting of the tool is necessary for cutting to length. The act of grinding cuts the bearing or pin the right length and forms the fillets. The location of the pins and bearings within the small limits allowed is accompanied by a massive index bar, so that the workman does no measuring whatever for location of bearings or pins. The entire time of handling and producing these five bearings and four pins from the rough forging to the nicely-sized and finished condition is 85 minutes. It is clear that when all the conditions of the finished work are considered the grinding wheel and machine have removed metal faster than the lathe. Again, it is not simply a case of removing pounds of metal per hour, but the removal of it in such a manner as to accomplish certain results in the least time.

The ends of these shafts beyond the bearings are turned before grinding. The entire list of operations to make a finished shaft from the forging is as follows:

Cut off ends and center	6 minutes
Rough grind bearings	15 minutes
Turn ends	8 minutes
Rough grind pins	20 minutes
Finish grind pins	20 minutes
Finish grind bearings and ends	25 minutes
Square ends	6 minutes
Total time	100 minutes

A little time could be saved if it were practical to secure forgings with pins and bearings 1⅝ inch in diameter over the entire length instead of with the depression of 1½ inch between shoulders, as the wheel can be forced more rapidly when the face has the same amount of work to do as the fillets. Here again tradition is strong and difficult to change at once, because the depression is better for those who turn the work. A little co-operation would save on dies and time in grinding.

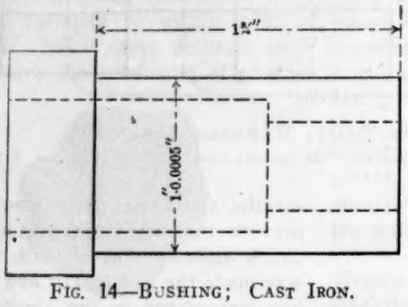


FIG. 14—BUSHING; CAST IRON.
Stock removed, 0.010 inch; limit, 0.0005 inch; time, 45 pieces per hour.

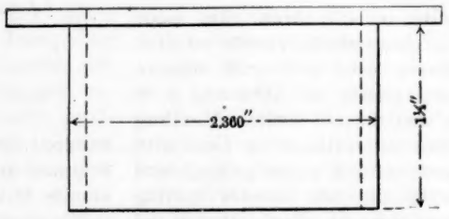


FIG. 15—BUSHING; PRESSED STEEL.
Stock removed, 0.025 inch; limit, 0.0005 inch; time, 60 pieces per hour.

FIG. 16—CHILLED ROLL.
Stock removed, 3/8 inch; time, roll face, 2½ hours; previous lathe time, 12 hours.

FIG. 17—CHILLED ROLL.
Stock removed, ½ inch; time, roll face, 7 hours; journals and ends, 3½ hours; total, 10½ hours; lathe time, 23 hours.

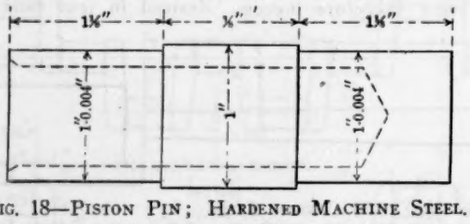


FIG. 18—PISTON PIN; HARDENED MACHINE STEEL.
Stock removed, 0.015 inch; limit, 0.0005 inch; time, 25 pieces per hour.

Lack of Knowledge Chief Obstacle.

There are hundreds of other cases where the grinding wheel is used to remove metal in a more economical manner than with steel-cutting tools, some of which are shown in Figs. 9 to 18.

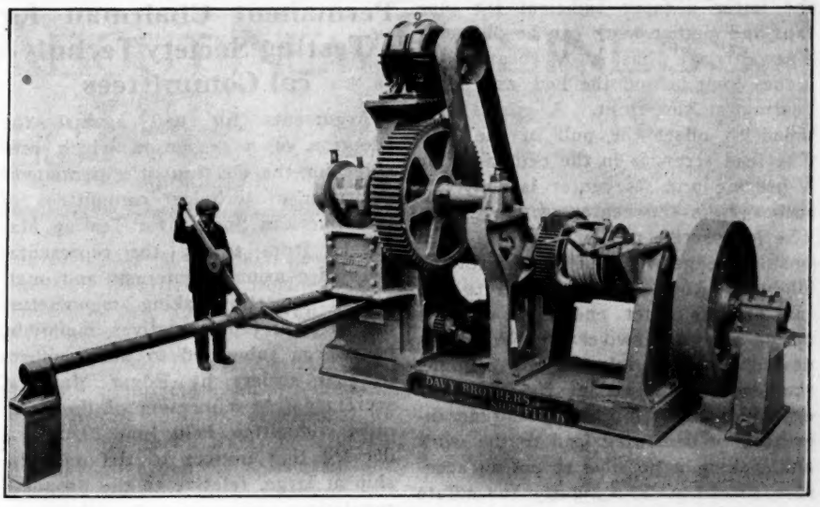
Automatic grinding is a late development in the field. Certain work of which large numbers of pieces are made is ground by wholly automatic means. The work is conveyed to the machine by gravity in a hopper or shute and is chucked, ground and delivered to the receptacle. In a case where formerly, at piece work, 300 per day were ground, the automatic machine grinds 4 in a single minute, about 2,300 per day.

When the knowledge of grinding becomes more common and the opposition to increased production on the part of the workmen shall have been more nearly overcome, the field will be still more extended. It is worthy of more systematic co-operation and if we get together we will be rewarded with success. The engineer is the one who by education and training is best fitted to take up the important question of the field for grinding.

A New High-Speed Hot-Billet Shear

An interesting high-speed hot-billet shear has recently been installed in the British works of the Talbot Continuous Steel Process, Ltd. The machine, which was built by Davy Brothers, Ltd., Sheffield, is capable of cutting 4½ x 4½-inch steel billets at the low temperature of 600 degrees Fahr. Several points of novelty are embodied in this design, which will be of interest to American engineers. In the first place the usual method of starting and stopping the shear blade has, up to the present, been that of throwing in a gag between the thrust rod and the knife holder, and this meant that a shock on the framework was likely to occur when the gag was inserted or on the knife coming in contact with the stock to be cut; trouble has, moreover, frequently occurred owing to the operator not inserting the gag properly, breakage of the machine being the usual result. In the present type the gag is done away with; a coil clutch, which is seen in the illustration between the second and third bearing, is fitted to the second motion shaft and used for starting and stopping the blade. In the older type of shear the speed was limited by the likelihood of breakage occurring owing to the insertion of a gag. In the present arrangement, which has been found to work very well in practice, the shear is permitted to run with perfect smoothness at a much higher speed than 20 cutting strokes per minute. In order to put the blades into and out of action a hand lever is provided which operates the coil clutch quickly and easily and on the same shaft there is also provided an internal friction brake which stops the blade at the top of its stroke. This brake is operated by the same lever as the coil clutch and goes into action on disengaging the clutch. This method of working gives the additional advantage that the fly wheel attached to the first motion shaft is capable of storing energy and thus reducing the shock on the motor drive.

The machine, which has a 7-inch stroke, is driven by a 50-horsepower motor on top of the frame through a belt and cut steel gears. The details of design have been, mechanically, well carried out. For example, there are no overhung driving gears, as all the wheels are supported by outside bearings, with the exception, of course, of the motor pulley. The shear frame is in one piece of cast steel, the apron slides being fitted with hard cast iron liners adjustable for wear. In order to reduce attendance to a minimum the three phosphor bronze bearings which carry the first-motion shaft for the fly wheel are ring-oiling and the shear is fitted with live rolls, deflecting table and measuring gear in order to facilitate operation at high speed.



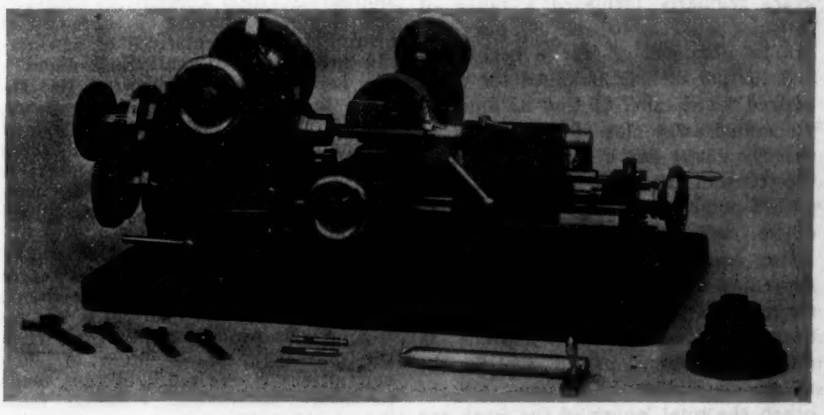
DAVY HOT BILLET SHEAR.

New Thread Milling Machine

In the precision types of metal working machinery the capacity for a large variety of work is often a feature of great value to the manufacturer, especially if the products turned out are of the smaller order. It is to fill such a requirement of the shop that a new type of thread milling machine has been designed by the Waltham Machine Works, Waltham, Mass. This machine is intended to do work of a smaller size and larger variety and with greater precision than some of the larger machines now on the market are designed to handle. It has several features of design not found in other machines of this type, and is especially adapted for tap making down to the smallest size; for micrometer screws and other similar work.

The cutter is 1½ inches diameter and is mounted on a hardened spindle driven through a train of spur and bevel gears. The cutter head can be swivelled in a vertical plane around the center line of the cutter and horizontally from a point near the spindle. The graduations of the vertical swivel are on an arc of 4 inches in diameter and are in full sight on the top of the head. By using the horizontal swivel and a cutter of the proper angle a buttress thread with one side perfectly square can be cut, and by reversing the work and giving a second cut a square thread is obtained.

The cross-slide has a bearing 10 inches long and its feed screw has a friction index with divisions reading to 1-2000 inch. A stop screw is provided as a safeguard against setting the cutter too deep while duplicating work. The nut for the feed screw is in a block that can be secured either to a part of the carriage or to the sliding bar of a taper attachment. With



WALTHAM THREAD-MILLING MACHINE.

the latter a taper sufficient for pipe taps and similar work can be obtained. The carriage has a V bearing 12 inches long behind the bed, and a flat bearing at the front. A gib is provided to offset the pull of the belt. The lead screw is in the center of the V-bearing and its center is only 3½ inches from the center of the cutter. The lead screw nut is held in a fixed position lengthwise but can be rotated slightly. An arm is fastened to the nut and its outer end is held by a spring against a swivel bar. With this device, by setting the bar at an angle, the feed of the carriage can be accelerated or reduced, thus giving an increased or decreased lead to the work and making it possible to cut an accurate thread with a lightly inaccurate lead screw.

A hand-operated clutch is provided at the left end of the lead screw that is to be disengaged when the cut is completed, so that the carriage can be returned to its starting position by turning the hand-wheel attached to the right hand end. A friction index similar to the one on the cross-slide screw is attached to this hand-wheel. The headstock spindle takes a regular lathe chuck, capacity ⅝ inch clear through, and is driven by a worm and gear. The driving pulley is connected to the worm shaft by a toothed clutch that is automatically disengaged upon the completion of the cut. A hand-wheel is provided for turning the worm spindle by hand when setting the cutters, etc. An indexing device is attached to the work spindle by which double, triple and quadruple threads can be cut. The worm shaft pulley has four steps and as it is interchangeable with its driving pulley on the counter, and as the round belt can run either to the next larger or smaller step than the one in line, at least 16 changes of feed speed can be obtained.

The movement of the spindle is transmitted to the screw through a train of gears and with the change gears regularly furnished a range of threads between 10 and 80 per inch can be obtained. A range between 4 and 100 per inch is arranged for when desired. The tailstock and its spindles are milled away close to the center so that the cutter can be brought clear to the center line. Two spindles, one with a point and the other with a hole center, are provided. A thread 6 inches long and of any diameter not exceeding 2 inches can be cut, and if the portion of the work not threaded does not exceed the chuck capacity, ⅝ inch, on one end or the size of the tailstock spindle, 13-16 inch, on the other, the total length of the work can be indefinite.

Permanent Chairman for Testing Society Technical Committees

Arguments for and against the adoption of a resolution which provides for the election of a permanent chairman of technical committees of the American Society for Testing Materials, from among the representatives of consuming interests and unattached experts, making manufacturers, or their representatives, ineligible, have been submitted to the members of that society by Edgar Marburg, secretary. At a meeting of the executive committee, held June 29, it was decided that notices to the membership at large, relative to the proposed regulations governing the chairmanships of technical committees, be accompanied by arguments, pro and con, in connection with the letter ballot. The final draft of these arguments has been made, and those favoring the adoption of the resolution debarring manufacturers from chairmanships of such committees is summed up as follows:

The policy of according producers equal numeric representation with consumers and unattached experts on committees dealing with subjects involving commercial interests, but debarring them from the permanent chairmanship, is a sufficiently liberal one, and usually results in a predominance of manufacturers at committee meetings.

It is undesirable that the permanent chairmanship of a technical committee concerned with subjects of a partly commercial nature should be held by a producer, because,

(a) His commercial iterests are of a more direct and personal nature than those of the consumer;

(b) The activity of a committee is very largely controlled by the chairman;

(c) It is less apt to insure a vigorously progressive policy;

(d) It tends to weaken confidence in outer circles in the output of the committee.

To restrict the permanent chairmanship of technical committees engaged with subjects having a commercial bearing to representatives of consuming interests and unattached experts, has been the fixed policy of the society for the past five or six years, and if that policy should be sustained by the present vote of the membership at large, it is not intended to make it retroactive. That is to say, the chairmanships of existing committees will remain unaffected.

To restrict the permanent chairmanship of technical committees to representatives of non-producing interests, tends to avoid any clash between consuming and producing interests when the permanent organization of such committees is effected, and thus tends to insure harmonious relations from the start.

The members of newly appointed committees are not likely to recognize the power of the chairman in stimulating or retarding the activities of a committee, and may, therefore, acquiesce in the proposed selection of a member of the producing interests to the possible disadvantage of the committee's work.

The following summary against the adoption of the resolution has also been submitted to the membership:

To debar representatives of producing interests from the permanent chairmanship of a technical committee is

(a) Inconsistent with the policy of making no such discrimination in determining eligibility of membership in the governing board of the society, namely, the executive committee;

(b) An infringement on the rights of technical committees;

(c) Contrary to the practice in certain European countries.

In the selection of a permanent chairman, the committee should be governed only by considerations of personal and technical qualifications, irrespective of the commercial affiliations of the individual.

The representatives of the producing interests are apt to command, in the nature of things, a broader and more accurate knowledge in respect to their products than the representativs of consuming interests, or unattached experts.

The fact that the chairmanship of a given committee is held by a producer will not weaken the force of specifications prepared by that committee, inasmuch as the specifications will, in the end, stand or fall on their own merits.

The ballots will be counted on Dec. 15, and if the vote should result against the adoption of the resolution, the question of substituting another paragraph in the regulations governing technical committees for the existing one, set aside by this vote, will be brought up at the annual meeting.

Specifications for Staybolt Iron, Methods of Testing, and Yellow Pine Bridge and Trestle Timbers have been finally adopted by the society by letter ballot. Notwithstanding the increase of dues from $5 to $10 per annum, the membership has been increased and now totals 1,303. In consequence of the increased dues the finances of the American Society for Testing Materials are, for the first time in its history, on a thoroughly sound and satisfactory basis. Secretary Marburg also calls attention to the fact that American membership in the International Association for Testing Materials has grown rapidly during the year and now numbers 438, which is larger than the membership of any other country. The sixth Congress of the International Association for Testing Materials will be held in New York City, in September, 1912.

POINTERS ABOUT NEW BUSINESS

(In order to assist the post office in delivering letters to new concerns, it is suggested that the names of incorporators be written in the lower left hand part of every envelope addressed to such new companies.)

New Buyers.—

The following manufacturing companies have filed articles of incorporation.

The Kibbe-Workinger Foundry Co., Elkhart, Ind.; $25,000; by O. G. Kibbe, C. S. Workinger and Z. G. Kibbe.

The Standard Casting Machine Co., St. Louis, Mo.; $25,000; by James M. Allen, H. M. Felhauer, and L. F. Allen.

The Detroit Steel Products Co., Chicago; metal products; $500,000; by Charles R. Ayars, 171 Washington street, Chicago, Ill.

The Meadows Sheet Metal Works, Meadows, Ill.; metal works; $15,000; by Edwin Whorrall, D. N. Claudon, Chris Oyer, Meadows, Ill.

The Dickerson Mfg. & Supply Co., Clinton, Ill.; $200,000; by Charles L. Dickerson, J. H. Hinckley, Robert R. Porterfield, Clinton, Ill.

The Hessler Foundry & Mfg. Co., Oswego, N. Y.; castings of metals, etc.; $50,000; by George J. Hessler, Elizabeth A. Hessler, Charles W. Hessler, Syracuse, N. Y.

The Noll Pump Co., Manhattan, New York; machinery, pumps, etc.; $100,000; Eugene Delmar, 115 Broadway; George V. Maynard, 27 William street, and John J. McGuire, 115 Broadway, New York City.

The Aluminum Specialties Mfg. Co., Fulton, N. Y.; aluminum specialties; $75,000; by Thomas S. Jackson, 2 Jewett Place, George H. Spitzle, 29 Jewett Place, Utica, N. Y.; John R. Sullivan, 224 West Second street, Fulton, N. Y., and two others.

The Bauer Metallizing Bronze Co., Brooklyn, N. Y.; metal and imitation metal articles; $12,000; John F. Connor, 437 Putnam avenue, Brooklyn, N. Y.; Frank A. Scott, 14 Melville place, Woodhaven, Long Island, N. Y.; Frank Van Buren, 438 East 164th street, the Bronx, New York City.

The Gilbert Mfg. Co., Ltd., Toronto; capital, $250,000; to manufacture metal goods; provisional directors, Alfred W. Briggs, Harold R. Frost, Henry E. Grosch and others.

Walker Motor Car Co, Ltd., Chatham, Ont.; capital, $200,000; provisional directors, Michael A. Delaney, William J. Regan, John Franklin Mount and others.

Hands, Ltd., Toronto; capital, $50,000; to manufacture motors and all power-driven vehicles; provisional directors, Wm. J. Hands, J. E. M. Fetherstonhaugh, John H. Sharman and others.

Canadian Top Co., Ltd., Filbury, Ont ; capital, $100,000; to manufacture automobile tops and accessories; provisional directors, Edwin M. Hobson, Harry H. Hallet, Edmund G. Odette and others.

The Gramm Motor Truck Co. of Canada, Ltd., Walkerville, Ont.; capital, $100,000; provisional directors, Herbert W. Acason, Jonathan K. Webster, John V. Carr and others.

Amherst Foundry Co., Ltd., incorporated in Nova Scotia, has been authorized to carry on business in Ontario, with head office at Toronto, on a capital not exceeding $40,000.

J. Wiss & Sons Co., incorporated in New Jersey, has been authorized to carry on business as manufacturer of cutlery, etc., in Ontario, with head office at Toronto, on a capital not exceeding $40,000.

New Construction:—

The Simonds Mfg. Co. is completing its new construction at Lockport, N. Y., and will shortly begin the installation of machinery in several of the buildings.

The Richmond Hill Iron Foundry Co., Richmond Hill, L. I., is planning to build an addition estimated to cost $4,500 to its gray iron foundry on Grant street.

The Hassell Iron Works Co., Colorado Springs, Colo., has taken out a permit to build a foundry, estimated to cost $5,000, which will be added to its already extensive plant.

The Belmont Iron Works, Eddystone, Pa., which has been constructing a new power house for some months, has about completed it, and arrangements are being made for placing it in operation.

The Webster Mfg. Co., Chicago, has arranged for removing its plant to Tiffin, O., before May 1. It will erect five buildings at Tiffin, with a total floor space of 200,000 square feet.

The American Steel & Wire Co. is building an addition to its American plant, Cleveland, 80 x 125 feet, one story. It is to be used as a wire rope warehouse, and will be finished by Feb. 1.

The addition to the shops of the American Foundry & Furnace Co., at Bloomington, Ill., is being rapidly completed. This addition will be used as a warehouse, the former warehouse space being inadequate.

Construction of a foundry for the Philadelphia & Reading railroad, at Reading, Pa., has been begun by the contractors, George W. Beard & Co. The building will be of brick, and will have a slag roof.

Joseph Joseph & Bros. Co., Cincinnati, has leased 100 acres at Lebanon, Pa., upon which buildings will be constructed for use as a scrap yard. Mayo Fechheimer, formerly New York manager, will manage the Lebanon yard.

W. T. Garratt & Co., brass and aluminum founders and machinists, San Francisco, have closed a lease for ten years on a two-story building and basement, now being built at the northeast corner of Folsom and Fremont streets on a lot 137 x 137 feet.

Tate, Jones & Co., Inc., have just received another order from the Pittsburg district for their fuel oil burning equipment for open-hearth furnaces, to be used as an auxiliary in case of natural gas shortage. This equipment will be placed at the plant of the Mackintosh-Hemphill Co.

The Delphos Foundry & Mfg. Co., Delphos, O., is installing lathes, planers, etc., in that portion of its plant vacated by a printing press concern, which removed into a new location. It is the intention of the Delphos company to build road making machinery.

M. Rumely & Co., of Laporte, Ind., is negotiating for the purchase of ten acres in Des Moines, Ia., on which it is proposed to erect a branch of the Rumely Co. The plans call for a one-story fireproof, reinforced con-

crete building, 103 x 133 feet, which will be used for manufacturing parts of oil fuel engines.

General Industrial:—

Railway Appliance Co., Chicago, has increased its capital stock from $10,000 to $50,000.

The Edgar Allen Manganese Steel Co., Chicago, has certified to a dissolution of business.

Osborne High-Pressure Joint & Valve Co., Metropolis, Ill., has certified to an increase in the number of directors from six to nine.

The Star Brass Works, Kansas City, has removed its plant from Twenty-first and Campbell streets to Eighteenth street and Baltimore avenue.

The Obenberger Drop Forge Co., Milwaukee, Wis., has filed an amendment increasing its capital stock from $30,000 to $60,000.

Superior Iron Works, Superior, Wis., recently shipped a consignment of machinery to Bombay, India, which will be used in equipping a dredge to be used in Bombay harbor.

The Cohoes Rolling Mill Co., Cohoes, N. Y., will take over a building which is being vacated by another concern Jan. 1, and will use the acquired building as a pipe threading shop and storage room.

Tests of the machinery equipment installed in the new erecting shops of the Lackawanna railroad at Scranton, Pa., are being made and it is hoped to have the plant in operation by Dec. 15.

The bankruptcy petition against the Carpenter-Kerlin Gear & Machine Co., New York, manufacturer of automobile gears, was recently dismissed because of the failure of the petitioning creditors to appear.

The Gilbert Hunt Mfg. Co.'s property at Walla Walla, Wash., has been taken over by the Gilbert Hunt Co., which will engage in the manufacture of structural steel on a larger scale. It has been extensively engaged in manufacturing threshing machinery.

The Sycamore Foundry, Sycamore, Ill., which has been idle for four years, has been placed in operation by W. R. Persin & Co., Chicago, manufacturing hydraulic power presses. The company is removing from Chicago to secure more room to house its foundry and machine shop in one plant.

The St. Louis Concrete Machinery Co., St. Louis, recently incorporated, advises that it expects to manufacture a concrete mixing machine, and a tubular steel tower to take the place of an ordinary wooden tower now in use. Circular matter descriptive of its product will be ready for distribution shortly.

Jann & Shank Mfg. Co., Chicago, has certified to a change of name to the Chicago Automatic Screw Machine Co. The incorporation of the Jann & Shank Mfg. Co., also of Chicago, has been certified by George L. Walker, William J. Walker and Harold D. Huszagh, all of Chicago, with capital stock of $1,000.

Walton-Van Huffel Mfg. Co., Galesburg, Ill., has been re-organized, Peter Van Huffel having purchased the entire capital stock. He will continue as general manager and Mrs. Mary Moore as secretary. The business will continue to be conducted under the old firm name.

The Connolly Steel Casting Co., Chelsea, Mass., which was recently incorporated with a capitalization of $5,000, has purchased the Chelsea plant of the Lundin Steel Castings Co., of Neponsett, and is using all the Lundin company's equipment, which takes care of from eight to ten molders. Archibald Munroe, foreman of the Lundin company, is also foreman for the Connolly company, and is secretary of the Connolly company. James Connolly is president and John Ashman treasurer, both holding like positions with the Lovewell-Henrici Co., of Chelsea, making gray iron castings. However, the two are entirely different concerns, and are run independently of each other.

The Baldwin Forging & Tool Co., Columbus, O., advises respecting a recently published note as to its new plant at Parkersburg, W. Va., that its buildings are about completed, and it is moving its machinery from the Columbus plant to the new location. It expects to have the equipment installed and the plant running in good shape by Feb. 1. The new buildings have these dimensions: Main building, 60 x 860 feet; warehouse, 50 x 140 feet; handle warehouse, 50 x 200 feet; pickling house, 50 x 50 feet; machine shop, 50 x 100 feet. All of the new equipment for the plant has been purchased. Its output will be exclusively shovels, plates and scoops, and its capacity will be about 500 dozen per day.

The Consolidated Casting Co., Syracuse, N. Y., valves, stove trimmings, and hardware specialties, announces that it was formed Nov. 1 to combine the interests of the Turnbull-Smith Co., of Syracuse, and W. F. Green, of Mechanicsville, N. Y., to increase the facilities for marketing their individual lines. The Green company has been manufacturing stove trimmings for over 20 years, which will be continued to be manufactured at Mechanicsville, as will also the Turnbull-Smith Co.'s bath basin and sink bibs, together with its castings in brass, bronze and aluminum; but the Syracuse foundry will still continue to produce castings in the above metals. The main office of the consolidation will be at Mechanicsville.

Trade Notes:—

The offices of Goff, Horner & Co., Ltd., district sales agents for the American Rolling Mill Co., have been removed from the Frick building to the eighteenth floor of the Oliver building, Pittsburg.

Edgar Allen & Co., Ltd., Chicago, announce that they have appointed Schrock & Squires, 291 Pearl street, New York City, eastern manager for the sale of Allen tool steels, stocks of which will be constantly carried by Schrock & Squires in order to meet promptly the needs of customers.

M. M. Broad & Co., Chicago, announce that they have dissolved the firm of M. M. Broad & Co. M. M. Broad has affiliated himself as a member of the firm of the American Iron & Supply Co., doing a regular scrap iron brokerage business in the First National Bank building, Chicago. L. J. Newman, his former partner, has accepted a position with the Ohio Iron & Metal Co., of the same city.

Fires:—

The foundry of L. G. McKnight & Sons Co., Gardner, Mass., was damaged, Dec. 1, the loss being estimated at $3,000.

The plant of the Spalding-May Foundry & Machine Co., Atlanta, Ga., was badly damaged, Dec. 1, the loss being estimated at $30,000. A number of valuable patterns were also damaged. It is understood that the plant will be rebuilt at once.

The Pidgeon-Thomas Iron Co., Memphis, suffered serious damage to its four-story building, on Dec. 1, the loss being estimated at $100,000, partly covered by insurance.

The foundry of the Casey-Hedges Co., Chattanooga, Tenn., was seriously damaged, Nov. 29, the loss being about $15,000, covered by insurance. The machine shop was not damaged.

The shops of the F. K. Russell Machine Co., Dallas, Tex., were seriously damaged, Nov. 30, with a loss of about $10,000.